N00174.AR.001834
NSWC INDIAN HEAD
5090.3a

FINAL ACCIDENT PREVENTION PLAN SITE 17 UNEXPLODED ORDNANCE AVOIDANCE FOR BARRIER INSTALLATION NSWC INDIAN HEAD MD

07/01/2015

CH2M HILL

Final

Accident Prevention Plan
Site 17 UXO Avoidance for Barrier Installation

Naval Support Facility Indian Head
Indian Head, Maryland

Contract Task Order 088

July 2015

Prepared for

Department of the Navy
Naval Facilities Engineering Command
Washington

Under the

NAVFAC CLEAN 1000 Program
Contract N62470-08-D-1000

Prepared by

CH2MHILL®

Chantilly, Virginia

Contents

Appendix

Acronyms and Abbreviations

AHA	activity hazard analysis
APP	Accident Prevention Plan
CFR	*Code of Federal Regulations*
CO/COR	Contracting Officer/Representative
CPR	cardiopulmonary resuscitation
EAP	Employee Assistance Program
EMR	Experience Modification Rate
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSM	Health and Safety Manager
IARC	International Agency for Research on Cancer
IIPP	Injury and Illness Prevention Program
MSDS	Material Safety Data Sheet
OSHA	Occupational Safety and Health Administration
PPE	personal protective equipment
SSHO	Site Safety Health Officer
SSHP	Site Safety and Health Plan
USACE	U.S. Army Corps of Engineers
UXO	unexploded ordnance

1 Signature Page

Accident Prevention Plan (APP)
UXO avoidance for Site 17 Hydraulic Barrier Installation, Indian Head

Indian Head, Maryland

Date June 2015

Plan Preparer:

Name: Stephen Brand, OHST
Phone Number: 757-671-6211

Date: 6/4/2015

Plan Approval Project Manager:

Name:
CH2M HILL
Program/Project Manager
Phone:

Date:

Plan Approval Munitions Response HSSE Manager:

George DeMetropolis, PhD
CH2M HILL
Munitions Response HSSE Manager
Phone: (619) 564-9627

Date:

Plan Concurrence:

Name: Mark Orman, CSP
CH2M HILL
Program/Health and Safety Manager
Phone: 414-712-4138

Date: 15 June 2015

2 Background Information

This APP has been developed to protect and guide the personnel conducting unexploded ordnance (UXO) avoidance for series of two demonstration projects by another contractor. Indian Head Site 17 is a 1,000-foot stretch of shoreline along the Mattawoman Creek where metal parts were discarded from the 1960s until the early 1980s. There are two plumes on Site 17—South Plume that has been treated with zero-valent iron, where the concentrations are declining, and North Plume, where concentrations are as high as 180,000 parts per billion. This APP has been prepared to meet applicable requirements of the U.S. Army Corps of Engineers (USACE) Safety and Health Requirements Manual EM 385-1-1 (USACE 2011), 29 *Code of Federal Regulations* (CFR) 1910.1200 Hazard Communication Standard, Hazardous Waste Operations or emergency response as required by 29 CFR 1910.120 and 29 CFR 1926.65, and the corporate safety and health policies of CH2M HILL, Inc. This APP has been constructed to directly track with the EM 385-1-1 2011 Appendix A "Minimum Basic Outline for Accident Prevention Plan."

Various portions of this work shall also be conducted under non-hazardous waste site protocols. The site safety and health plan (SSHP) for this project is included as **Appendix A**.

2.1 Contractor

CH2M HILL, Inc.

2.2 Contract Number

N62470-08-D-1000

2.3 Project Name

Indian Head Site 17 Hydraulic Barrier UXO Avoidance

2.4 Project Description and Location

This APP presents the hazards known or anticipated to be present at Indian Head Site 17, Indian Head, Maryland. UXO avoidance is the sole task to be conducted by CH2MHILL for this project. The Environmental Security Technology Certification Program (ESTCP) contractor will be conducting a small scale and a large scale demonstration project. The small-scale demonstration will be conducted near the existing building north of South Plume and east of North Plume. The large-scale demonstration will be conducted within the North Plume area, near the shore of Mattawoman Creek (Figure 2). The plan outlines the health and safety procedures that will be used to conduct UXO avoidance for the ESTCP contractor during construction of the barrier wells (injection well installation and monitoring/pumping well installation), and surface avoidance during the project. The small scale demo is expected to be performed in July 2015, and the large scale demo is expected to be performed after July 2016. This project-specific APP will be used by CH2M HILL and its subcontractors to identify and mitigate task-specific hazards and to select appropriate health and safety protective measures.

Onsite personnel must review the APP and sign an agreement to comply with its provisions prior to commencing onsite work. The APP and attached SSHP are considered operational documents that are subject to revisions in response to various site-specific conditions that may be encountered. However, the documents may be modified or updated only with the approval of the health and safety manager (HSM) and project manager.

2.5 Contractor Accident Experience

CH2M HILL's exceptional safety performance greatly exceeds the industry average. Our injury and illness rates and our Experience Modification Rate (EMR) have averaged 0.67 over the past 5 years.

Following are examples of our achievements:

- An EMR of less than 1 over the past 5 years, which is the average accident injury experience for the industry, with a 2014 EMR of 0.64 (or 64 percent) of the industry average (NAICS 54133).

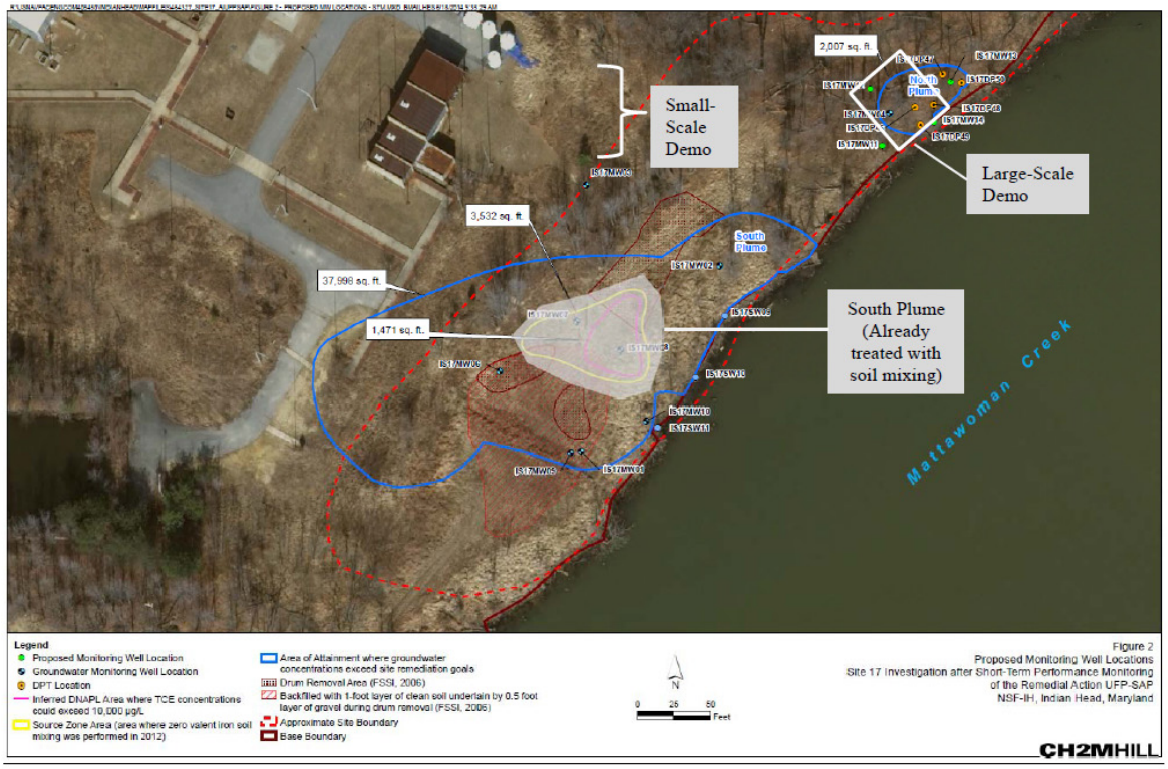
Category	2010	2011	2012	2013	2014
Employee Hours	12,842,086	10,704,063	9,759,106	9,636,525	10,081,283
Experience Modification Rate (EMR)	0.71	0.66	0.69	0.63	0.64
Fatalities	0	0	0	0	0
Recordable Incidents	9	13	12	13	9
Recordable Incident Rate *	0.14	0.24	0.25	0.27	0.18
Recordable Incident Rate Average*	1.0	1.0	0.8	0.7	0.7
Lost Workday (LWD) Incidents (DART)**	1	3	0	2	1
LWD Incident Rate (DART)	0.02	0.06	0.0	0.04	0.02

2.6 Work Requiring Activity Hazard Analysis

The planned field tasks requiring activity hazard analyses (AHAs) are as follows:

- 01 UXO Avoidance

An AHA for the above field task is included in **Appendix A**.



3 Statement of Safety and Health Policy and Compliance Procedures

CH2M HILL is committed to providing a safe and healthful workplace for employees. The conditions will be ensured through an aggressive and comprehensive worker safety and health program that is integrated with other site worker protection activities. We regard employee protection as a priority and are committed to developing, implementing, and improving safety and health practices that will afford optimal protection to employees and enable continuous improvement of the quality of worker protection performance. The safety and health of employees will take precedence whenever conflicts with production or other objectives arise.

Managers and supervisors are held accountable for worker safety and health. Accountability is achieved by assigning worker protection responsibilities, evaluating personnel performance, and holding personnel accountable for worker protection performance.

In addition to complying with this APP and their corporate safety and health program, persons working under the SSHP are encouraged to be active participants in their workplace safety and health activities, and to actively take advantage of the worker rights in a responsible manner, without reprisal.

CH2M HILL has embraced a philosophy for health safety and environment excellence. The primary driving force behind this commitment to health and safety is simple: employees are the company's most significant asset, and management values their safety, health, and welfare. Also, top management believes that all injuries are preventable. The safety culture empowers employees at all levels to accept ownership for safety and take whatever actions are necessary to eliminate injury. Our company is committed to world-class performance in health and safety and also understands that world-class performance in health and safety is a critical element in overall business success.

CH2M HILL is committed to the prevention of personal injuries, occupational illnesses, and damage to equipment and property in all of its operations; to the protection of the general public whenever it comes in contact with the Company's work; and to the prevention of pollution and environmental degradation.

Company management, field supervisors, and employees plan safety into each work task in order to prevent occupational injuries and illnesses. CH2M HILL management extends its full commitment to health and safety excellence.

3.1 Objective

The objective of the CH2M HILL program is to provide a place of employment free of all recognized hazards that are causing or will likely result in death or serious physical harm to our employees. The objective can be facilitated by developing and administering an overall health and safety program, which establishes written policies and procedures to serve as vehicles through which the program requirements will be implemented.

3.2 Purpose

The purpose of this project APP, in conjunction with the project-specific or program health and safety documents, is to define the policies, procedures, and requirements that must be implemented for the CH2M HILL program and to establish the requirements, responsibilities, and expectations for management, supervisors, employees, and subcontractors that may participate in the execution of the program projects. It is the intent of this APP to address applicable requirements set forth by 29 CFR 1910, 29 CFR 1926, EM 385 1-1, and CH2M HILL policies and procedures incorporated by reference herein.

3.3 Goals

The health and safety goal for this project and the overall goal for the CH2M HILL program are to eliminate workplace accidents, gain worker acceptance through cooperation and training, and provide our clients with a responsible, well-trained, safety-oriented work force.

CH2M HILL considers safety the highest priority during work at all project sites and in its business offices and has established a goal of zero incidents. CH2M HILL's program will be conducted in a manner that minimizes the probability of near misses, injury, illness, and equipment or property damage.

All management and employees are to strive to meet the project-specific health, safety, and environment goals outlined below. The team will be successful only if everyone makes a concerted effort to accomplish these goals. The goals allow the project to stay focused on optimizing the health and safety of all project personnel and, therefore, making the project a great success.

The project has established the following 11 specific goals and objectives:

1. Create an injury-free environment.
2. Have zero injuries or incidents.
3. Provide management leadership for health, safety, and environment by communicating performance expectations, reviewing and tracking performance, and leading by example.
4. Ensure effective implementation of the SSHP and APP through education, delegation, and teamwork.
5. Ensure 100-percent participation in training programs, personal protective equipment (PPE) use, and health, safety, and environment compliance.
6. Continuously improve safety performance.
7. Maintain free and open lines of communication.
8. Make a personal commitment to safety as a value.
9. Focus safety improvements on high-risk groups.
10. Continue strong employee involvement initiatives.
11. Achieve health and safety excellence.

3.4 Safe Work Policy

It is policy to perform work in the safest manner possible. Safety must never be compromised. To fulfill the requirements of this policy, an organized and effective safety program must be carried out at each location where work is performed.

CH2M HILL believes that all injuries are preventable, and is dedicated to the goal of a safe work environment. To achieve this goal, every employee on the project must assume responsibility for safety.

Every employee is empowered to:

- Conduct their work in a safe manner
- Stop work immediately to correct any unsafe condition that is encountered
- Take corrective actions so that work may proceed in a safe manner

Safety, occupational health, and environmental protection will not be sacrificed for production.

3.5 Standards of Conduct Violations

All individuals associated with this project must work injury-free and drug-free and must comply with the Standards of Conduct, the SSHP and APP, and the site safety requirements. Commonly accepted standards of conduct help maintain good relationships between people. They promote responsibility and self-development. Misunderstandings, frictions, and disciplinary action can be avoided by refraining from thoughtless or wrongful acts. Violations of the standards of conduct would include, but not be limited to the following:

- Failure to perform work

- Inefficient performance, incompetence, or neglect of work
- Willful refusal to perform work as directed (insubordination)
- Negligence in observing safety regulations, poor housekeeping, or failure to report on-the-job injuries or unsafe conditions
- Unexcused or excessive absence or tardiness
- Unwillingness or inability to work in harmony with others
- Discourtesy, irritation, friction, or other conduct that creates disharmony
- Harassment or discrimination against another individual
- Failure to be prepared for work by wearing the appropriate construction clothing or PPE, or bringing the necessary tools
- Violation of any other commonly accepted reasonable rule of responsible personal conduct
- Violation of the safety and health requirements of their corporation's policy or of this APP
- Unauthorized or illegal possession, use, or sale of alcohol or controlled substances on work premises, during working hours, while engaged in corporate activities, or in corporate vehicles
- Use or sale of firearms or explosives on work premises

See Section 1.0 of the SSHP, (Appendix A).

3.6 Intolerable Offenses

Certain employee conduct may be so intolerable as to justify removal from the project. Intolerable offenses and actions will include, but not be limited to, the following:

- Any manager, supervisor, foreman, or other person in charge of the work being performed who requires requests, asks, threatens with their job, allows, or condones employees to work in or around unsafe acts or conditions
- Any employee, supervisor, or manager who knowingly falsifies any investigative documents or testimony involving an investigation
- Any employee, supervisor, or manager who openly exhibits disregard, defiance, or disrespect for the safety program
- Any employee who violates established safety rules, regulations, or codes that endanger themselves or other employees
- Any and all parties involved in workplace violence, including physical encounters (fighting) or threats of violence, theft, or destruction of property
- Any employee, supervisor, or manager failing to comply with procedures contained in the subcontract, SSHP and APP, USACE EM 385-1-1 Manual, or local safety laws and regulations that create the potential for serious or costly consequences
- Any employee who commits repeated minor offenses and shows a lack of responsible effort to correct these offenses

3.7 Enforcement and Discipline

CH2M HILL's Enforcement and Discipline procedures, the Standards of Conduct, the Intolerable Offenses, and the Drug-Free Workplace policy will be thoroughly reviewed with each employee during the employee project orientation.

3.7.1 Intolerable Offenses

CH2M HILL practices zero tolerance for intolerable offenses. Individuals found participating in such offenses will be dealt with according to our policy and may be subjected to the following:

- Suspended from work for 3 days without pay
- Immediately discharged and not allowed to return

3.7.2 Other Violations

Other violations will be handled accordingly:

- First offense—employee will receive a written warning
- Second offense—employee will receive a 2-day suspension without pay
- Third offense—employee will be discharged

3.8 Subcontractor Default

If the subcontractor fails to comply with any of the requirements of the subcontract, SSHP and APP, or local safety laws and regulations, the prime contractor may issue a stop work order to the subcontractor. Thereupon, the subcontractor will immediately cease all work or portion of work that may be specifically designated in the stop work order until the prime contractor has concluded in writing that the subcontractor has corrected its failure of performance. No adjustments will be made to the subcontractor price or schedule as a result of any stop work orders being issued by the prime contractor. A stop work order will be given to the noncompliant subcontractor on the date of deficiency. If the subcontractor fails to correct the deficiencies noted in the stop work order within 3 working days following the written notice from the prime contractor, the prime contractor may, without prejudice to any other rights or remedies under the subcontract or at law or equity, suspend all further payments to subcontractor and/or terminate subcontractor's right to continue performance of the work.

3.9 Incentive Program

CH2M HILL will encourage all parties to implement a safety incentive program for the project that rewards workers for exhibiting exemplary safety behaviors. Actions that qualify are those that go above and beyond what is expected. Actions that will be rewarded include spotting and correcting a hazard, bringing a hazard to the attention of your foreman, telling your foreman about an incident, coming up with a safer way to get the work done, stopping a crew member from doing something unsafe, etc. The program will operate throughout the project, covering all craft workers. The incentive program will be communicated to all employees during the project employee orientation and project safety meetings.

3.10 Posting of Health and Safety Information

There will be a posting area, accessible by all workers onsite, and in clear view for the posting of site-specific health and safety information. The posted information will be protected from the environment and kept updated as project information changes.

4 Responsibilities and Lines of Authorities

Section 4 identifies the personnel who have specific safety responsibilities on the project.

4.1 Personnel with Safety Responsibilities

Participating personnel are responsible for complying with safety procedures and for proactively making safety awareness part of their day-to-day conduct.

The following positions have specific corporate and project safety responsibilities:

- HSM

- Project manager
- Site safety health officer (SSHO)
- Other project field staff

Appendix A (the SSHP) lists the specific personnel that will fill the stated positions for this project. See Section 4 of **Appendix A** for details and lines of authority.

All work is conducted under a Behavior-based and loss prevention system program. AHAs are a vital part of this work, as well as using Pre-task Safety Planning. All staff members are accountable for their own health and safety, and have the authority to request a work stoppage when they feel unsafe behaviors, actions, or situations are occurring.

All work requiring a competent person per the Occupational Safety and Health Administration (OSHA) definition (29 CFR 1926.32(f)), will not be started until that competent person is designated and on site. *Competent person* means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

For all general tasks, the SSHO is the competent person, unless otherwise noted for specific tasks.

5 Subcontractors and Suppliers

Subcontractors and suppliers providing services onsite will be subject to the safety provisions of this APP and those included in **Appendix A**. See Section 4.3 of **Appendix A** for details. At this time, there are no subcontractors planned for use to fulfill this task order.

CH2M HILL and any identified subcontractors shall conduct site work in accordance with this APP and associated documents. CH2M HILL shall address compliance with specific safety and health requirements, including those listed in Section 9, and through safety meetings at the start of each shift. The specific safety and health requirements and site conditions will be reviewed with field personnel during the meetings. All parties shall also comply with the requirements of their respective Injury and Illness Prevention Programs (IIPPs).

6 Training

Site workers, supervisors, and managers will have training appropriate to their assigned duties and as specified in the SSHP and AHAs that are applicable to the work being performed. As specified in Section 4.0 of **Appendix A**, the SSHO (who will also conduct the project safety and health inspections), will meet the training and indoctrination requirements prescribed in this APP and **Appendix A**, as well as the Hazardous Waste Operations and Emergency Response (HAZWOPER) supervisory training. All employees engaging in hazardous waste operations or emergency response shall receive appropriate training as required by 29 CFR 1910.120 and 29 CFR 1926.65. At a minimum, the training shall have consisted of instruction in the topics outlined in 29 CFR 1910.120 and 29 CFR 1926.65. Since there are no tasks planned that require a competent person, competent-person-level training is not required. Personnel who have not met these training requirements shall not be allowed to engage in HAZWOPER activities.

Details of required training are specified in Section 15 of **Appendix A**.

All SSHO's (primary and alternates) will have completed 30-hour OSHA Construction Safety training, as well as all required internal training courses under CH2M HILL requirements. The courses include, but are limited to, First-aid/cardiopulmonary resuscitation (CPR), Fire Extinguisher, Blood Borne Pathogens, and many others.

The SSHO shall also serve as the project competent person for all general tasks not covered by a specialized subcontractor.

7 Safety and Health Inspections

7.1 Inspection Details

The project SSHO (specifically identified in the attached SSHP) will provide onsite safety and health inspections for this project. The SSHO will meet the training and indoctrination requirements as prescribed in this APP and **Appendix A**, including HAZWOPER supervisory training, CPR, first-aid, and bloodborne pathogen awareness training. The SSHO will also have hands-on experience overseeing these types of tasks.

See Section 21 of **Appendix A** for further inspection details.

7.2 Recordkeeping

Project safety and health documentation will be maintained by the SSHO for CH2M HILL staff and verified for the respective contractors assigned to this task order. Records to be maintained (both in project files of each of the respective companies, and in the onsite field trailer) will include the following:

- HAZWOPER training certificates
- First-aid and CPR training certificates
- Documentation of medical surveillance
- Daily safety and health briefing acknowledgment forms
- Deficiency identification, correction, and follow-up documentation
- Accident reports and investigation records
- Respirator usage and fit training, as applicable
- Material Safety Data Sheet (MSDS) for sample preservatives

7.3 External Inspection/Certifications

External inspections or certifications will not be required for this work.

8 Accident Reporting

The SSHO and HSM are responsible for all incidents reporting. Specific details are found in Section 22 of **Appendix A**.

Also, all significant accidents shall be reported as soon as possible, but not more than 24 hours afterwards to the Contracting Officer/Representative (CO/COR). The contractor shall thoroughly investigate the incident and submit the findings of the investigation along with appropriate corrective actions to the CO/COR in the prescribed format as soon as possible, but no later than 5 working days following the incident. Implement corrective actions as soon as reasonably possible.

The following occurrences require immediate accident notification:

- A fatal injury
- A permanent total disability
- A permanent partial disability
- The hospitalization of three or more people resulting from a single occurrence
- Property damage of $200,000 or more.

9 Plans Required By the EM 385-1-1 Safety Manual

Plans required by the EM 385-1-1 Safety Manual are presented in the following subsections. Plans and procedures that are not applicable to this project are indicated as such with the non-applicability rationale.

9.1 Layout Plan

Site layout is located at the end of section 3 in the SSHP. It will be provided prior to start of work to all staff.

9.2 Emergency Response Plans

Details are provided in Section 19 and 20 of **Appendix A**. Medical support for this project will be provided onsite and offsite. The plans fulfill the following:

- Procedures and tests (01.E.01)
- Spill plans (01.E.01, 06.A.02)
- Firefighting plan (01.E.01, Section 9)
- Posting of emergency telephone numbers (01.E.05)
- Man overboard/abandon ship (sec. 19.A.04)
- Medical support (section 03.A.02: 03.D)

9.2.1 Onsite Medical Support

When two or more field staff members are present onsite, at least two will have current certification in basic first-aid and CPR, along with bloodborne pathogens annual training. Unless injured, the SSHO will be the lead person to initiate any required first-aid until offsite medical support can be engaged.

Location and direction to medical support facilities shall be posted in a conspicuous location where temporary construction facilities or support are established at the project site. Where temporary construction facilities or a designated administrative/support office are not allowed or provided, the list shall be available for quick reference by the SSHO personnel executing site operations and its location shall also be made known to other site personnel.

In addition, the project shall be outfitted with first-aid kits of suitable size and quality (contents) to meet health and safety requirements for onsite first-aid and CPR response. Personal protective devices shall be provided such that universal precautions against bloodborne pathogens can be exercised while administering CPR or first-aid. Eye wash stations, either portable or stationary, will be available.

An effective means of communication to summon transportation of injured workers to medical treatment facilities must be evaluated and established prior to the start of field activities. Communication devices shall be tested in the area of use to assure functionality. When a medical facility or physician is not accessible within 5 minutes of an injury to a group of two or more employees for the treatment of injuries, at least two employees on each shift shall be qualified/certified to administer basic first-aid and CPR, along with bloodborne pathogens annual training. Unless injured, the SSHO/site safety coordinator will be the lead person to initiate any required first-aid until offsite medical support can be engaged.

It must be understood that for life-threatening emergencies, get or summon medical attention immediately.

During non-life-threatening emergencies, follow these procedures as appropriate:

- Notify appropriate emergency response authorities (for example, 911).
- The site supervisor or site safety coordinator will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury.
- Initiate first-aid and CPR where feasible and where worker “Universal Precautions” to bloodborne pathogens can be completed.
- Perform decontamination where feasible; lifesaving and first-aid or medical treatment take priority.
- Make certain that the injured person is accompanied to the emergency room.
- When contacting the medical consultant, give your name and telephone number, the name of the injured person, the extent of the injury or exposure, and the name and location of the medical facility where the injured person was taken.

9.2.2 Offsite Medical Support

In the event of a medical emergency or if follow up to basic first-aid is required, request emergency medical transport as opposed to transporting the injured person in a private or company vehicle where practical. The contact and location information for the nearest offsite medical support is presented below. A map indicating the travel route to the nearest medical facility with emergency care is presented in the SSHP.

Civista Medical Center, 701 Charles Drive, La Plata, MD
(301)-609-4000 (emergency room direct line)

On base call: (301) 744-4333

If in restricted area, use red call boxes – no cell phone usage in restricted area! *Identify name, nature of your emergency and exact location.

9.2.3 Hospital Addresses and Route

Information on the nearest medical facility with emergency care is discussed in Section 19 of the SSHP.

9.3 Alcohol and Drug Abuse Prevention

*(*References: DFARS, Subpart 252.223-7004 and CH2M HILL SOP HSE-105, *Drug Free Workplace Program)*

In order to maintain a drug- and alcohol-free workplace, the respective parties have established a drug- and alcohol-free awareness program to educate employees on the following: (1) the danger of drug abuse and alcohol in the workplace; (2) the corporate drug- and alcohol-free workplace policy; (3) the availability of any drug and alcohol counseling, rehabilitation, and employee assistance programs; and (4) the penalties that may be imposed upon employees for drug abuse and alcohol violations and violations of the corporation's drug- and alcohol-free workplace. Such education includes the distribution of the drug- and alcohol-free workplace policy at the employment interview; a discussion of the drug- and alcohol-free workplace policy at the new employee orientation session; and inclusion of the company's drug- and alcohol-free workplace policy in the employee handbook and any other personnel policy publications.

9.3.1 CH2M HILL

The corporation has vital interests in ensuring a safe, healthy, and efficient working environment for our employees, their coworkers, and clients we serve. The unlawful or improper use of controlled substances or alcohol in the workplace presents a danger to everyone. In addition, as a federal contractor, we have a duty to comply with the requirement of the Drug-Free Workplace Act of 1988. For these reasons, we have established as a condition of employment and continued employment with the corporation the following drug- and alcohol-free workplace policy.

Employees are prohibited from reporting to work or working while using illegal or unauthorized substances. Employees are prohibited from reporting to work or working when the employee uses any drugs, except when the use is pursuant to a doctor's orders and the doctor has advised the employee that the substance does not adversely affect the employee's ability to safely perform his or her job duties. This does not include the authorized use of alcohol at corporate-sponsored functions or activities.

In addition, employees are prohibited from engaging in the unlawful or unauthorized manufacture, distribution, sale, or possession of illegal or unauthorized substances and alcohol in the workplace, including on client-paid time, on client premises, in client vehicles, or while engaged in client activities.

In accordance with the Drug-Free Workplace Act of 1988, employees must notify their supervisor of any criminal drug statute conviction for a violation occurring within the workplace within 5 days of such conviction.

Employment with the corporation is conditioned upon an employee's full compliance with the foregoing drug- and alcohol-free workplace policy. Any violation of this policy may result in disciplinary action, up to and including discharge. Furthermore, any employee who violates this policy who is subject to termination

may be permitted in lieu of termination, at the corporation's sole discretion, to participate in and successfully complete an appropriate treatment, counseling, or rehabilitation program as recommended by a substance abuse professional as a condition of continued employment and in accordance with applicable federal, state, and local laws.

Consistent with its fair employment policy, the corporation maintains a policy of nondiscrimination and reasonable accommodation with respect to recovering addicts and alcoholics, and those having a medical history reflecting treatment for substance abuse conditions. We encourage employees to seek assistance before their drug and alcohol use renders them unable to perform their essential job functions or jeopardizes the health and safety of themselves or others. The corporation will attempt to assist its employees through referrals to rehabilitation, appropriate leaves of absence, and other measures consistent with the corporation's policies and applicable federal, state, or local laws.

The corporation further reserves the right to take any and all appropriate and lawful actions necessary to enforce this drug- and alcohol-free workplace policy, including, but not limited to, the inspection of corporation-issued lockers, desks, or other suspected areas of concealment. Employees are required to submit for "post-accident" and "for cause" drug and alcohol screening following any incident. Random drug and/or alcohol screening is a requirement of CH2M HILL.

9.3.2 Subcontractor Management

The subcontractor must comply with the provisions of this program. As a minimum, the subcontractor must provide a written statement that their drug-free workplace program meets the minimum requirements outlined in CH2M HILL's program.

The prime contractor project manager and site safety coordinator can request to be provided copies of any subcontractor's employee's last negative screening results. The results cannot be over 12 months old.

It is the responsibility of subcontractors to transfer this plan to the lower-tiered subcontractors.

9.3.3 Prescription and Nonprescription Drugs

Employees using prescription or nonprescription drugs that could impair their functions on the project are required to notify the employer in advance of such drug use.

Failure to report prescription and nonprescription drugs as required above, illegally obtaining the substance, or use that is inconsistent with the prescription or label may be subject to disciplinary action.

The subcontractor is required to document that all of their employees have also been provided with a drug-free workplace and alcohol education program.

9.3.4 Employee Assistance Program

Employees may participate in CH2M HILL's Employee Assistance Program (EAP) immediately upon hire. The EAP helps eligible employees and their immediate families with a wide range of problems, including marriage and family problems; emotional problems; alcoholism and alcohol abuse; drug abuse and dependency; financial problems; compulsive gambling; and eating disorders. Employee conversations and records under the EAP are strictly confidential. The administrative cost of this program is fully paid by the company.

9.4 Site Sanitation Plan (Section 02)

The following constitutes the site sanitation plan for this project.

9.4.1 Drinking Water

A cooler containing an adequate supply of drinking water will be available at the site for the site workers and replenished each day. The cooler will be stored outside the exclusion zone on or near the field vehicles. Either clean, disposable cups or bottled water will be provided.

9.4.2 Toilets

Toilets are available in nearby base buildings. Separate facilities for women are required, EM 385-1-1, Section 02.E.01, paragraph a.

9.4.3 Washing Facilities

Access to washing facilities is available at the same location as the toilets.

Access to toilets is available on the facility.

However, toilet facilities on construction sites shall be provided as follows:

Minimum Toilet Facilities at Construction Sites

Number of Personnel	Number of Toilets
20 or fewer	One
20 or greater	One toilet seat and One urinal per 40 workers
Greater than 200	One toilet seat and One urinal per 50 workers

Note: The above requirements do not apply to mobile crews or to normally unattended work locations if employees working at these locations have transportation immediately available to nearby toilet facilities. Separate toilet rooms for each sex need not be provided if toilet rooms can only be occupied by one person at a time, can be locked from the inside, and contain at least one toilet seat.

Toilet facilities shall be constructed so that the occupants are protected against weather and falling objects; all cracks shall be sealed, and the door shall be tight-fitting, self-closing, and capable of being latched. Adequate ventilation shall be provided and all windows and vents shall be screened. Toilet facilities shall be constructed so that the interior is lighted.

Provisions for routinely servicing and cleaning all toilets and disposing of the sewage shall be established before placing toilet facilities into operation. The method of sewage disposal and the placement location selected shall be in accordance with federal, state, and local health regulations.

9.4.4 Washing Facilities

Access to washing facilities is available at the same location as the toilets.

Washing facilities shall be provided at toilet facilities and as needed to maintain healthful and sanitary conditions. Each washing facility shall be maintained in a sanitary condition and provided with water (either hot and cold running water or tepid running water), soap, and individual means of drying. If it is not practical to provide running water, hand sanitizers may be used as a substitute. Washing facilities shall be in close proximity to the worksite.

9.4.5 Food Service

No food service will be provided onsite. Site workers will either bring their food to the site to be consumed outside of the exclusion zone and only after proper decontamination, or will go offsite for food.

9.4.6 Waste Disposal

Any investigation-derived waste will be stored, profiled, and disposed of in accordance with the project work plan.

Nonhazardous waste materials and rubbish will be contained in a garbage bag and disposed of with regular site sanitary service disposal or at an offsite disposal facility.

9.4.7 Vermin Control

No enclosed spaces are being constructed for this project and waste materials will be securely stored and transported offsite to provide vermin control.

9.5 Access and Haul Road Plan (Section 4.B)

NOT APPLICABLE. No access or haul roads are being constructed for this work.

9.6 Respiratory Protection Plan (Section 05.G)

Only field personnel who have been medically cleared, fit-tested, and trained in the use and maintenance of the appropriate respiratory protection will be allowed to proceed with work under conditions requiring respiratory protection. Respiratory protection is not anticipated for the small scale demonstration project, but is possible for the large scale demonstration project.

See Section 14.2 of **Appendix A** for specific details if required due to site hazards.

9.7 Health Hazard Control Plan (Section 06.A)

Safety and health hazards for performing work covered under this APP are identified through the preparation of AHAs (provided in **Appendix A**). Each AHA also indicates recommended controls for each identified potential safety/health hazard. Further hazards and controls are outlined in Sections 7 through 11 of **Appendix A**.

Appropriate PPE shall be supplied and used at all times for this project. PPE selection is based on the selected hazard control measures specified in the AHAs and Section 14 of **Appendix A**.

9.8 Hazard Communication Program

Chemical products may occasionally be stored and used on the project site, and/or stored on field vehicles. Examples of chemicals include hydrogen peroxide, gases used to calibrate sensing equipment, and lubricants. Other chemicals may be used as well. The chemicals may pose hazards, including flammability, corrosiveness, reactivity and incompatibility, and toxicity. Because of these potential hazards, special precautions must be taken including the following:

- Tracking and controlling hazardous chemical products received and stored
- A hazard evaluation of each chemical product, using such sources as MSDSs
- Informing workers of the potential hazards through training, MSDSs, and appropriate labeling of containers
- Air monitoring in the case of potential respiratory hazards
- Design and implementation of engineering controls such as ventilation and source control
- Developing storage, handling, housekeeping, and decontamination procedures
- Assigning appropriate PPE such as eye and face protection, gloves, body protection, and respirators. Respirator usage by CH2M HILL or subcontractor employees will be in accordance with the employees' IIPP.
- Training personnel who will be handling chemicals on safe handling procedures, PPE, and emergency and spill cleanup procedures.

Hazardous substances that may be encountered in soil on the project site are not covered by this program. **Appendix A**, Section 12, addresses chemical and other hazard assessment and mitigation associated with site contaminants, including investigation and remediation of waste materials.

9.8.1 Chemicals Covered by this Project Program

For the purposes of this program, chemicals considered to be hazardous are those:

- Listed in the OSHA Permissible Exposure Limits.
- Included in the American Conference of Governmental Industrial Hygienists Threshold Limit Values for Chemical Substances (2007).
- Found to be suspected or confirmed carcinogens by the National Toxicology Program in the latest edition of the Annual Report on Carcinogens, or by the International Agency for Research on Cancer (IARC) in the latest edition of the IARC monographs.

No chemicals are expected to be used during field activities as part of this scope of work.

Exceptions to this policy, by OSHA definition, include consumer products that are used in a consumer fashion and pose no more of an exposure hazard than a consumer would face.

9.8.2 Training

Employees who work with or are potentially exposed to hazardous chemicals will receive initial training on the elements of this Hazard Communication Program, including the following:

- Content and requirements of this program and the OSHA Hazard Communication Standard
- The potential physical and toxic hazards of the chemicals used in their work location, and especially the hazards of non-routine tasks
- Chemical inventory and tracking procedures
- Location of this Hazard Communication Program, the chemical inventory, and the MSDSs
- How to read MSDSs
- Methods to detect the release of or exposure to chemicals in their area
- Content and interpretation of labels
- Safe use and handling of chemicals
- Required PPE
- Basic emergency procedures

Additional training will be provided annually, whenever a new chemical is added to the workplace, and when non-routine tasks are planned.

9.8.3 Labeling

The SSHO will ensure that hazardous chemicals brought onto the site are properly labeled with at least the following information, in English, as a minimum, and the language of non-English-speaking employees who may use the product, as appropriate. This labeling includes the following:

- The identity of the product and chemical components
- Appropriate hazard warnings
- Name and address of the manufacturer, importer, or other responsible party

Hazard warnings will also be transmitted in the form of the National Fire Prevention Agency or Hazardous Materials Information System color-coded warnings, which are ranked on a 0 to 4 scale. When chemicals are transferred to a portable container, labels containing chemical identification and hazard warnings must be affixed to the portable container.

9.8.4 Current Onsite Inventory (see attachments 2&3 of the SSHP)

(Chemical inventory in attachment 2 of the SSHP)

9.9 Process Safety Management Plan (Section 06.B.04)

NOT APPLICABLE. This work does not include chemical management.

9.10 Lead Abatement Plan

NOT APPLICABLE. Lead is not known to be an exposure concern for this project.

9.11 Asbestos Hazard Control Plan

NOT APPLICABLE. Asbestos is not known to be an exposure concern for this project.

9.12 Radiation Safety Program (Section 06.E.03.a)

NOT APPLICABLE. Radiation hazards not anticipated for this work.

9.13 Abrasive Blasting (Section 06.H.01)

NOT APPLICABLE. This work does not involve abrasive blasting. Or see section 9.1 of the SSHP for specific details.

9.14 Heat/Cold Stress Monitoring Plan (Section 06.I.02)

See Section 10.4 of **Appendix A**.

9.15 Crystalline Silica Monitoring Plan (Section 06.M)

NOT APPLICABLE. Crystalline silica is not known to be an exposure concern for this project. Avoidance tech will stand away when drilling underway, and out of any dust cloud (if any generated).

9.16 Night Operations Lighting Plan

NOT APPLICABLE. Work will not be conducted at night.

9.17 Fire Prevention Plan

See Section 8.6 of **Appendix A** for more details.

9.18 Wildland Fire Management Plan

NOT APPLICABLE. Wildland fires are not anticipated as a risk for this work.

9.19 Hazardous Energy Control Plan

NOT APPLICABLE. Servicing or maintenance on a system where the unexpected energizing, startup, or release of kinetic or stored energy that could cause injury or damage to occur is not part of this project.

9.20 Critical Lift Procedures

NOT APPLICABLE. No critical lifts will be performed under this scope of work.

9.21 Contingency Plan for Severe Weather

NOT APPLICABLE. Development of a severe weather contingency plan is related to marine operations and therefore does not apply to this scope of work. However, exterior fieldwork on this project will be suspended in the event of severe weather that could impact field activities. Such work suspension will be communicated immediately to the project manager.

This section is covered in detail of section 10.1 of the SSHP.

9.22 Float Plan (Section 19.F.04)

NOT APPLICABLE. This work is not over water or requiring use of a boat.

9.23 Fall Prevention and Protection Plan (Section 21.C)

NOT APPLICABLE. Not part of our scope of work.

9.24 Demolition Plan (Engineering and Asbestos Surveys)

NOT APPLICABLE. This work does not involve demolition. However, if such work is required, it will be done by a subcontractor, and they will be required to submit a plan that complies with this section.

9.25 Excavation/Trenching Plan (Section 25.A.01)

NOT APPLICABLE. Not part of our scope of work.

9.26 Emergency Rescue (Tunneling) (Section 26.A)

NOT APPLICABLE. Tunneling and other underground construction is not necessary for this work.

9.27 Underground Construction Fire Prevention and Protection Plan

NOT APPLICABLE. Tunneling and other underground construction is not necessary for this work.

9.28 Compressed Air Plan

NOT APPLICABLE. This work does not require entering any compressed air environments.

9.29 Formwork and Shoring Erection and Removal Plans

NOT APPLICABLE. This work does not involve forming or shoring.

9.30 Precast Concrete Plan (Section 27.D)

9.31 Jacking Plan (Lift) Slab Plans

NOT APPLICABLE. These plans are associated with concrete masonry work, which is not part of this project.

9.32 Steel Erection Plan

NOT APPLICABLE. This work does not involve steel erection.

9.33 Site Safety and Health Plan

An SSHP is attached to this APP as **Appendix A**. The SSHP meets the requirements for work on hazardous waste sites in accordance with 29 CFR 1910.120 and 29 CFR 1926.65.

Detailed site-specific hazards and controls are provided in **Appendix A** and AHAs.

9.34 Blasting Plan

NOT APPLICABLE. This work does not involve blasting.

9.35 Diving Plan

NOT APPLICABLE. This work does not involve diving.

9.36 Confined Space

NOT APPLICABLE. Entry or proximity to confined space is not required for this project.

10 Risk Management Processes

The specific processes are addressed in multiple sections of **Appendix A**, depending on whether classified as physical, chemical, or other type (see Sections 7 through 15), as well as the task-specific AHAs included in **Appendix A**.

Appendix A
Site Safety and Health Plan

Final

Site Safety and Health Plan
Site 17 UXO Avoidance for Barrier Installation

Naval Support Facility, Indian Head
Indian Head, Maryland

Contract Task Order 088

July 2015

Prepared for

Department of the Navy
Naval Facilities Engineering Command
Mid-Atlantic

Under the

NAVFAC CLEAN 1000 Program
Contract N62470-08-D-1000

Prepared by

CH2MHILL®

Chantilly, Virginia

Contents

Attachments

Tables

Acronyms and Abbreviations

AHA	activity hazard analysis
ANSI	American National Standards Institute
APP	Accident Prevention Plan
APR	Air Purifying Respirator
ATV	all-terrain vehicle
bpm	beats per minute
CFR	*Code of Federal Regulations*
CO	carbon monoxide
COC	contaminant of concern
CPR	cardiopulmonary resuscitation
CRZ	contamination reduction zone
dBA	decibel(s) (A-weighted scale)
DEET	N,N-diethylmetatoluamide
DOT	Department of Transportation
DPT	direct-push technology
EM	environmental manager
EOS	emulsified oil substrate
ERC	Emergency Response Coordinator
EPA	United States Environmental Protection Agency
ESBG	Environmental Services Business Group
EVO	emulsified vegetable oil
EZ	exclusion zone
FID	flame ionization detector
GFCI	ground fault circuit interrupter
GW	groundwater
HAZWOPER	Hazardous Waste Operations and Emergency Response
HEPA	high-efficiency particulate air
HITS	Hours and Incident Tracking System
HRC	hydrogen release compound
HSE	health, safety, and environment
IRF	Incident Report Form
kV	kilovolt(s)
LEL	lower explosive limit
MEC	munitions and explosives of concern
$\mu g/m^3$	micrograms per cubic meter
MR	Munitions Response
MSA	Mine Safety Association
MSDS	Material Safety Data Sheet
NORM	Naturally Occurring Radiation Materials
ORE	Opportunity Risk Evaluation
OSHA	Occupational Safety and Health Administration

PCB	polychlorinated biphenyl
PEL	Permissible Exposure Limit established by OSHA
PFD	personal flotation device
PID	photoionization detector
PIM	potentially infectious material
PM	project manager
PPE	personal protective equipment
ppm	parts per million
PTSP	Pre-task Safety Plan
RCA	Root Cause Analysis
RHSM	responsible health and safety manager
RMSF	Rocky Mountain Spotted Fever
ROICC	Resident Officer in Charge of Construction
RPM	Remedial Project Manager
SB	soil boring
SBO	safe behavior observation
SC	safety coordinator
SCBA	self-contained breathing apparatus
SOP	standard operating procedure
SSC	site safety coordinator
SSD	Subslab Depressurization
SSHO	Site Safety & Health Officer
SSHP	Site Safety and Health Plan
STEL	short-term exposure limit
SZ	support zone
TCE	trichloroethylene
TLV	Threshold Limit Value
TWA	time-weighted average
USACE	U.S. Army Corps of Engineers
UV	ultraviolet
UXO	unexploded ordnance
WBGT	Wet Bulb Globe Thermometer
°C	degrees Celsius
°F	degrees Fahrenheit

Approval

This site-Safety Health Plan (SSHP) has been written for use by CH2M HILL only. CH2M HILL claims no responsibility for its use by others unless that use has been specified and defined in project or contract documents. The plan is written for the specific site conditions and identified scope(s) of work and must be amended if those conditions or scope(s) of work change.

By approving this SSHP, the responsible health and safety manager (RHSM) certifies that the personal protective equipment (PPE) has been selected based on the project-specific hazard assessment.

June 5, 2015

Plan Preparer:

Name: Stephen Brand, OHST
Phone Number: 757-671-6211

Date:06-10-2015

Plan Approval Project Manager:

Name:
CH2M HILL
Program/Project Manager
Phone:

Date:

Plan Approval Munitions Response HSSE Manager:

George DeMetropolis, PhD
CH2M HILL
Munitions Response HSSE Manager
Phone: (619) 564-9627

15 June 2015
Date:

Plan Concurrence:

Name: Mark Orman, CSP
CH2M HILL
Program/Responsible Health and Safety Manager
Phone: 414-712-4138

Date: 15 June 2015

SECTION 1

Introduction

Health, Safety and Environment Policy Commitment

Protection of people and the environment is a CH2M HILL core value. It is our vision to create a culture that empowers employees to drive this value into all global operations and achieve excellence in health, safety, and environment (HSE) performance.

CH2M HILL deploys an integrated, enterprise-wide behavior based HSE management system to fulfill our mission and the expectations of our clients, staff, and communities based on the following principles:

- We require all management and supervisory personnel to provide the leadership and resources to inspire and empower our employees to take responsibility for their actions and for their fellow employees to prevent injuries, illnesses, and adverse environmental impacts, and create a safe, healthy, and environmentally-responsible workplace.
- We provide value to clients by tailoring HSE processes to customer needs and requiring CH2M HILL employees and subcontractors to deliver projects that identify HSE requirements and commit to compliance with applicable HSE laws and regulations, company standards, and external requirements.
- We are committed to pollution prevention in conjunction with our Sustainability Policy and by offering our clients sustainable solutions.
- We aspire to continually improve our performance and influence others to redefine world-class HSE excellence.
- We evaluate our design engineering and physical work environment to verify safe work conditions and practices are established, followed, and corrected as needed.
- We assess and continually improve our HSE program to achieve and maintain world-class performance by setting and reviewing objectives and targets, reporting performance metrics, and routinely evaluating our program.
- We expect all employees to embrace our Target Zero culture, share our core value for the protection of people and the environment, understand their obligations, actively participate, take responsibility, and "walk the talk" on and off the job.

The undersigned pledge our leadership commitment, and accountability for making this Policy a reality at CH2M HILL.

Dated the 3rd day of October, 2014

Jacqueline C. Hinman
Chairman and Chief Executive Officer

Mike Soorjasy
Chief Delivery Officer& Operational Excellence

Lisa Glatch
Executive Vice President, Client Solutions and Sales

John Madia
Chief Human Resources Officer

Gary McArthur
Chief Financial Officer

Tom McCoy
General Counsel & Corporate Secretary

Elisa Speranza
Chief Communications Officer

Greg McIntyre
Operations Director

1.1 CH2M HILL Policy and Commitment

1.1.1 Safe Work Policy

It is the policy of CH2M HILL to perform work in the safest manner possible. Safety must never be compromised. To fulfill the requirements of this policy, an organized and effective safety program must be carried out at each location where work is performed.

CH2M HILL believes that all injuries are preventable, and we are dedicated to the goal of a safe work environment. To achieve this goal, every employee on the project must assume responsibility for safety.

Every employee is empowered to:

- Conduct their work in a safe manner
- Stop work immediately to correct any unsafe condition that is encountered
- Take corrective actions so that work may proceed in a safe manner

Safety, occupational health, and environmental protection will not be sacrificed for production. These elements are integrated into quality control, cost reduction, and job performance, and are crucial to our success.

1.1.2 Health and Safety Commitment

CH2M HILL has embraced a philosophy for health and safety excellence. The primary driving force behind our commitment to health and safety is simple: employees are CH2M HILL's most significant asset and CH2M HILL management values their safety, health, and welfare. Also, top management believes that all injuries are preventable. CH2M HILL's safety culture empowers employees at all levels to accept ownership for safety and take whatever actions are necessary to eliminate injury. Our company is committed to world-class performance in health and safety and also understands that world-class performance in health and safety is a critical element in overall business success.

CH2M HILL is committed to the prevention of personal injuries, occupational illnesses, and damage to equipment and property in all of its operations; to the protection of the general public whenever it comes in contact with our work; and to the prevention of pollution and environmental degradation.

CH2M HILL's management, field supervisors, and employees plan safety into each work task in order to prevent occupational injuries and illnesses. The ultimate success of CH2M HILL's safety program depends on the full cooperation and participation of each employee.

CH2M HILL management extends its full commitment to health and safety excellence.

1.1.3 Project-specific Health, Safety, and the Environment Goals

All management and employees are to strive to meet the project-specific health, safety, and the environment (HSE) goals outlined below. The team will be successful only if everyone makes a concerted effort to accomplish these goals. The goals allow the project to stay focused on optimizing the health and safety of all project personnel and, therefore, making the project a great success.

The project has established the following 11 specific goals and objectives:

- Create an injury-free environment
- Have zero injuries or incidents
- Provide management leadership for HSE by communicating performance expectations, reviewing and tracking performance, and leading by example
- Ensure effective implementation of the SSHP through education, delegation, and teamwork
- Ensure 100 percent participation in HSE compliance
- Continuously improve our safety performance
- Maintain free and open lines of communication
- Make a personal commitment to safety as a value
- Focus safety improvements on high-risk groups
- Continue strong employee involvement initiatives
- Achieve health and safety excellence

SECTION 2

Applicability

This SSHP applies to the following:

- All CH2M HILL staff, including subcontractors and tiered subcontractors of CH2M HILL working on the site
- All visitors to the construction site in the custody of CH2M HILL, including visitors from the client, the government, the public, and other staff of any CH2M HILL company)

This SSHP does not apply to the third-party contractors, their workers, their subcontractors, their visitors, or any other persons not under the direct control or custody of CH2M HILL.

This SSHP defines the procedures and requirements for the health and safety of CH2M HILL staff and visitors when they are physically on the work site. The work site includes the project area (as defined by the contract documents) and the project offices, trailers, and facilities thereon.

This SSHP will be kept onsite during field activities and will be reviewed as necessary. The SSHP will be amended or revised as project activities or conditions change or when supplemental information becomes available. The SSHP adopts, by reference, the Enterprise-wide Core Standards and standard operating procedures (SOPs), as appropriate. In addition, the SSHP may adopt procedures from the project work plan and any governing regulations. If there is a contradiction between this SSHP and any governing regulation, the more stringent and protective requirement will apply.

All CH2M HILL staff and subcontractors must sign the employee signoff form included in this document (**Attachment 1**) to acknowledge review of this document. Copies of the signature page will be maintained onsite by the site safety and health officer (SSHO).

SECTION 3

General Project Information

3.1 Project Information and Background

Project Number: 394325.MS.MS

Client: US Naval Facilities Engineering Command (NAVFAC)

Project/Site Name: Indian Head Site 17

Site Address: Indian Head, Maryland

CH2M HILL Project Manager: Margaret Kasim/WDC

CH2M HILL Office: Chantilly, Virginia

Date HSP Prepared: 6-10-2015

Date(s) of Site Work: July 2015 through December 2016

3.2 Site Background and Setting

This plan outlines the health and safety procedures that will be used to conduct UXO avoidance at this site. The avoidance support is expected to be performed in July 2015, and then again after July 2016. This project-specific SSHP will be used by CH2M HILL and its subcontractors to identify and mitigate task-specific hazards and to select appropriate health and safety protective measures.

Indian Head Site 17 is a 1,000-foot stretch of shoreline along the Mattawoman Creek where metal parts were discarded from the 1960s until the early 1980s. There are two plumes on Site 17—South Plume that has been treated with zero-valent iron, where the concentrations are declining, and North Plume, where concentrations are as high as 180,000 parts per billion. An Environmental Security Technology Certification Program (ESTCP) contractor will be conducting a small scale and a large scale demonstration project of drilling injection wells and injecting a mass flux reduction agent into the ground to build a wall around areas of high groundwater contamination. The small-scale demonstration will be conducted near the existing building north of South Plume and east of North Plume. It will test two types of mass flux reduction agent, building two different small cells with pumping wells inside and out, and doing aquifer tests on the area before and after injecting the mass flux reduction boundaries. The small scale test is in an area believed to be clean of contaminants. The large-scale demonstration will be conducted within the North Plume area, near the shore of Mattawoman Creek (Figure 2). This demonstration will create a mass flux reduction boundary around the area of chlorinated solvent contamination (north plume). Pumping tests before and after the installation of the boundary will measure the mass flux reduction. CH2M is only tasked with avoidance on this work, the remainder of the work will be conducted by or under the supervision of the ESTCP contractor.

See Site Map for layout of work area.

3.3 Contractor Accident Experience

CH2M HILL's exceptional safety performance greatly exceeds the industry average. Our injury and illness rates and our experience modification rate have decreased dramatically over the past 5 years. See Section 2.5 of the APP for details on past 5 years of history.

3.4 Description of Tasks

All CH2M HILL and subcontractor employees engaging in hazardous waste operations (HAZWOPER) or emergency response will receive appropriate training as required by 29 *Code of Federal Regulations* (CFR) 1910.120 and 29 CFR 1926.65 (or if required by subcontract). Personnel who have not met these training requirements will not be allowed to engage in HAZWOPER or emergency response activities. See the following subsection for HAZWOPER-regulated tasks.

3.4.1 HAZWOPER-regulated Tasks

- UXO avoidance

3.4.2 Non-HAZWOPER-regulated Tasks

Under specific circumstances, the training and medical monitoring requirements of federal or state HAZWOPER regulations are not applicable. The following tasks do not involve exposure to safety or health hazards associated with the hazardous waste operations. HAZWOPER training or medical requirements do not apply for the following tasks:

Tasks	Controls
• None	• Brief on hazards, limits of access, and emergency procedures.
•	• Post areas of contamination as appropriate.
•	• Perform air sampling/monitoring as specified in this SSHP.

3.5 Tasks Requiring Activity Hazard Analysis

Activity hazard analyses (AHAs) are required for all definable work tasks. As the project gets closer to initiation of field operations, additional information such as identification of subcontractor, specific equipment and/or tools is obtained, the AHAs will be updated accordingly. The planned field tasks requiring AHAs are as follows:

- 01 UXO Avoidance for monitoring well, injection well, and pumping well installation.

Refer to Section 7 for information regarding AHA preparation, training, and use for visual inspection and all other tasks associated with this project. The project AHA for the hazardous work operations listed above are included in **Attachment 10**.

3.7 Site Map


2,007 sq. ft.
Small-Scale Demo
Large-Scale Demo
3,532 sq. ft.
37,998 sq. ft.
1,471 sq. ft.
South Plume
South Plume (Already treated with soil mixing)
North Plume
Mattawoman Creek
IS17MW13
IS17TDP10
IS17TDP12
IS17MW14
IS17TDP9
IS17MW11
IS17MW15
IS17MW12
IS17SW9
IS17MW07
IS17SW10
IS17MW10
IS17SW11
IS17MW06
IS17MW08
Legend
Proposed Monitoring Well Location
Groundwater Monitoring Well Location
DPT Location
Inferred DNAPL Area where TCE concentrations could exceed 10,000 µg/L
Source Zone Area (area where zero valent iron soil mixing was performed in 2012)
Area of Attainment where groundwater concentrations exceed site remediation goals
Drum Removal Area (FSSI, 2006)
Backfilled with 1-foot layer of clean soil underlain by 0.5 foot layer of gravel during drum removal (FSSI, 2006)
Approximate Site Boundary
Base Boundary
N
0 25 50
Feet
Figure 2
Proposed Monitoring Well Locations
Site 17 Investigation after Short-Term Performance Monitoring
of the Remedial Action UFP-SAP
NSF-IH, Indian Head, Maryland
CH2MHILL

SECTION 4

Project Organization and Responsibilities

4.1 Client

Contact Name: Joseph Rail/Remedial Project Manager
Phone: 202-685-3105
Facility Contact Name: Nicholas Carros/Installation Restoration Program Manager
Phone: 301-744-2263

4.2 CH2M HILL

4.2.1 Project Manager

Project Manager Name: Margaret Kasim
CH2M HILL Office: WDC
Telephone Number: 703-375-5154
Cellular Number: 703-431-8288

The project manager (PM) is responsible for providing adequate resources (budget and staff) for project-specific implementation of the HSE management process. The PM has overall management responsibility for the tasks in the following bulleted list. The PM may explicitly delegate specific tasks to other staff, as described in sections that follow, but retains ultimate responsibility for completion of the following in accordance with this document:

- Incorporate standard terms and conditions, and contract-specific HSE roles and responsibilities in contract and subcontract agreements (including flow-down requirements to lower-tier subcontractors).
- Select safe and competent subcontractors by:
  - Choosing potential subcontractors based on technical ability and HSE performance
  - Implementing the subcontractor prequalification process
  - Ensuring that acceptable certificates of insurance, including CH2M HILL as named additional insured, are secured as a condition of subcontract award
  - Ensuring HSE submittals, subcontract agreements, and appropriate site-specific safety procedures are in place and accepted prior field mobilization
- Ensure copies of training and medical monitoring records, and site-specific safety procedures are being maintained in the project file accessible to site personnel.
- Provide oversight of subcontractor HSE practices per the site-specific safety plans and procedures.
- Manage the site and interfacing with third parties in a manner consistent with the contract and subcontract agreements and the applicable standard of reasonable care.
- Ensure that the overall, job-specific, HSE goals are fully and continuously implemented.
- Provide visible support and motivation for HSE programs, rules, procedures, processes, and training, leading by example and encouraging CH2M HILL employees to take ownership of HSE issues.
- Intervene or stop work when an unsafe condition or behavior is observed, and/or when an environmentally compromising condition is encountered.
- Make available to and require CH2M HILL employees to complete required HSE training within established timelines and provide project numbers for such training.

- Consistently and even-handedly enforce HSE rules, procedures, and requirements at the office and/or on project work sites.
- Promptly report all work-related HSE incidents or near misses.
- Wear any required PPE.
- Ensure CH2M HILL employees complete required HSE training within established timelines.
- Conduct, cooperate, or assist with HSE incident investigations.
- Consult with the Human Resources Delivery Partner before taking any disciplinary action (other than verbal counseling) associated with CH2M HILL Policy 203 and/or HSE programs rules, procedures, processes, and training.

4.2.2 CH2M HILL Responsible Health and Safety Manager, CSP

RHSM Name: Mark Orman
CH2M HILL Office: KNV
Telephone Number: 865-560-2825
Cellular Number: 414-712-4138

The RHSM is responsible for the following:

- Review and evaluate subcontractor HSE performance using the pre-qualification process.
- Approve the SSHP and its revisions as well as AHA.
- Review and evaluate subcontractor site-specific safety procedures for adequacy prior to start of subcontractor's field operations.
- Support the oversight (or SSHO's direct oversight) of subcontractor and tiered subcontractor HSE practices.
- Permit upgrades and downgrades in respiratory protection after reviewing analytical data.
- Conduct audits as determined by project schedule and coordination with PM.
- Participate in incident investigations, lessons learned, and loss and near loss reporting.

4.2.3 CH2M HILL Project Environmental Manager

Environmental Manager Name: Hope Wilson
CH2M HILL Office: ATL
Telephone Number: 678-530-4226
Cellular Number: 678-656-5411

The project environmental manager (EM) is responsible for the following:

- Provide environmental program support in areas such as training, auditing, planning, permit tracking, and subcontractor oversight as needed or as specified in the project environmental plan.
- Review and evaluate qualifications for subcontractors with a history of environmental noncompliance and for waste transportation and disposal subcontractors.
- Evaluate any spills, releases, or environmental permit incidents for appropriate follow-up actions, notifications, and recordkeeping requirements.
- Provide environmental compliance and environmental management expertise and advice to the project team as needed during the course of the project.

4.2.4 CH2M HILL Site Safety Health Officer

SSHO Name: Nelson Figeac
CH2M HILL Office: VBO
Telephone Number:
Cellular Number: 757-288-0374

The SSHO is responsible for verifying that the project is conducted in a safe manner including the following specific obligations:

- Conduct a health, safety, and environment orientation for all team members prior to entering the project work areas.
- Verify compliance with the requirements of this SSHP and applicable contractor SSHP, U.S. Army Corps of Engineers (USACE) EM 385-1-1 Manual, and federal, state, and local regulations.
- Verify this SSHP is current and amended when project activities or conditions change.
- Verify CH2M HILL site personnel and subcontractor personnel read the SSHP and sign the Employee Signoff Form, prior to commencing field activities.
- Verify CH2M HILL site personnel have completed any required specialty training (for example, fall protection, confined space entry, etc.) and medical surveillance as identified in this SSHP.
- Verify that project files include copies of subcontractor training and medical monitoring records, and accepted site-specific safety procedures prior to start of subcontractor's field operations.
- Act as the project "Hazard Communication Coordinator," and perform the responsibilities outlined in the SSHP.
- Act as the project "Emergency Response Coordinator," and perform the responsibilities outlined in the SSHP.
- Act as the project competent person for general tasks not conducted by a specialized subcontractor.
- Post the Occupational Safety and Health Administration (OSHA) job-site poster—the poster is required at sites where project field offices, trailers, or equipment-storage boxes are established. If you work in a state with an OSHA state plan, make sure the state plan poster is posted, if required.
- Hold and/or verify that safety meetings are conducted and documented in the project file initially and as needed throughout the course of the project (as tasks or hazards change).
- Verify that project health and safety forms and permits are being used as outlined this SSHP.
- Perform oversight and assessments of subcontractor HSE practices per the site-specific safety plan, and verify that project activity self-assessment checklists are being used as outlined this SSHP.
- Coordinate with the RHSM regarding CH2M HILL and subcontractor operational performance, and third-party interfaces.
- Verify appropriate PPE use, availability, and training.
- Ensure that the overall, job-specific, HSE goals are fully and continuously implemented.
- Conduct accident investigations, including root cause analysis.
- Calibrate and conduct air monitoring in accordance with the SSHP, and maintain all air monitoring records in the project file.
- Maintain HSE records and documentation.

- Facilitate client, OSHA, or other government agency inspections, including accompanying the inspector and providing all necessary documentation and follow-up.
- Deliver field HSE training as-needed, based on project-specific hazards and activities.
- Consistently and even-handedly enforce HSE rules, procedures, and requirements at the office and/or on project work sites.
- Wear any required PPE.
- Conduct, cooperate, or assist with HSE incident investigations.
- Contact the PM and RHSM when standards of conduct or CH2M HILL Policy 203 has been violated by a CH2M HILL employee.
- Contact the RHSM and PM in the event of an incident.
- Contact the RHSM and project EM in the event of a spill or release immediately so evaluation of reportable quantity requirements and whether agency reporting is required.
- When an apparent imminent danger exists, immediately remove all affected CH2M HILL employees and subcontractors, notify subcontractor safety representative, stop affected work until adequate corrective measures are implemented, and notify the PM and RHSM as appropriate.
- Document all verbal health-and-safety-related communications in project field logbook, daily reports, or other records.

4.3 Employee Responsibilities

All personnel are assigned responsibility for safe and healthy operations. This concept is the foundation for involving all employees in identifying hazards and providing solutions. For any operation, individuals have full authority to stop work and initiate immediate corrective action or control. In addition, each worker has a right and responsibility to report unsafe conditions or practices. This right represents a significant facet of worker empowerment and program ownership. Through shared values and a belief that all accidents are preventable, our employees accept personal responsibility for working safely.

Each employee is responsible for the following performance objectives:

- Understanding and abiding by CH2M HILL and client HSE programs, rules, procedures, processes, and training, including any that are project-specific
- Completing all required HSE training made available and accessible within established timelines
- Always wearing any required personal protective equipment
- Intervening or stopping work for you or other CH2M HILL employees when an unsafe condition or behavior is encountered or observed, and/or when an environmentally compromising condition exists
- Promptly notifying a supervisor, PM, SSHO, or RHSM when an unsafe condition or behavior is observed, and/or when an environmentally compromising condition exists
- Promptly reporting a supervisor, PM, SSHO, or RHSM all work-related health, safety , and environmental incidents or near misses
- Attending required project HSE pre-task briefings and meeting prior to performing work
- Cooperating or assisting with HSE incident investigations

4.3.1 Employee Authority

Each employee on the project has the obligation and authority to shut down any perceived unsafe work and during employee orientation, each employee will be informed of their authority to do so.

4.4 Client Contractors

(Reference CH2M HILL SOP HSE-215, *Contracts, Subcontracts and HSE Management Practices*)

Contractor: ESTCP (GSI Environmental)
Contact Name: Poonam Kulkarni
Telephone: 281-989-1903
Contractor Task(s): supervising installation of all injection wells, pumping and monitoring wells, conducting demonstration tests.

Contractor: Zebra Drilling
Contact Name: TBD
Telephone: 732-275-8333
Contractor Task(s): Subcontractor to GSI, drilling all wells.

This SSHP does not cover contractors that are contracted directly to the client or the owner. CH2M HILL is not responsible for the health and safety or means and methods of the contractor's work, and we must never assume such responsibility through our actions (such as advising on health and safety issues). In addition to these instructions, CH2M HILL team members should review contractor safety plans so that we remain aware of appropriate precautions that apply to us. Self-assessment checklists are to be used by the safety coordinator (SC) and CH2M HILL team members to review the contractor's performance only as it pertains to evaluating CH2M HILL exposure and safety. The RHSM is the only person who is authorized to comment on or approve contractor safety procedures.

Health-and-safety-related communications with contractors should be conducted as follows:

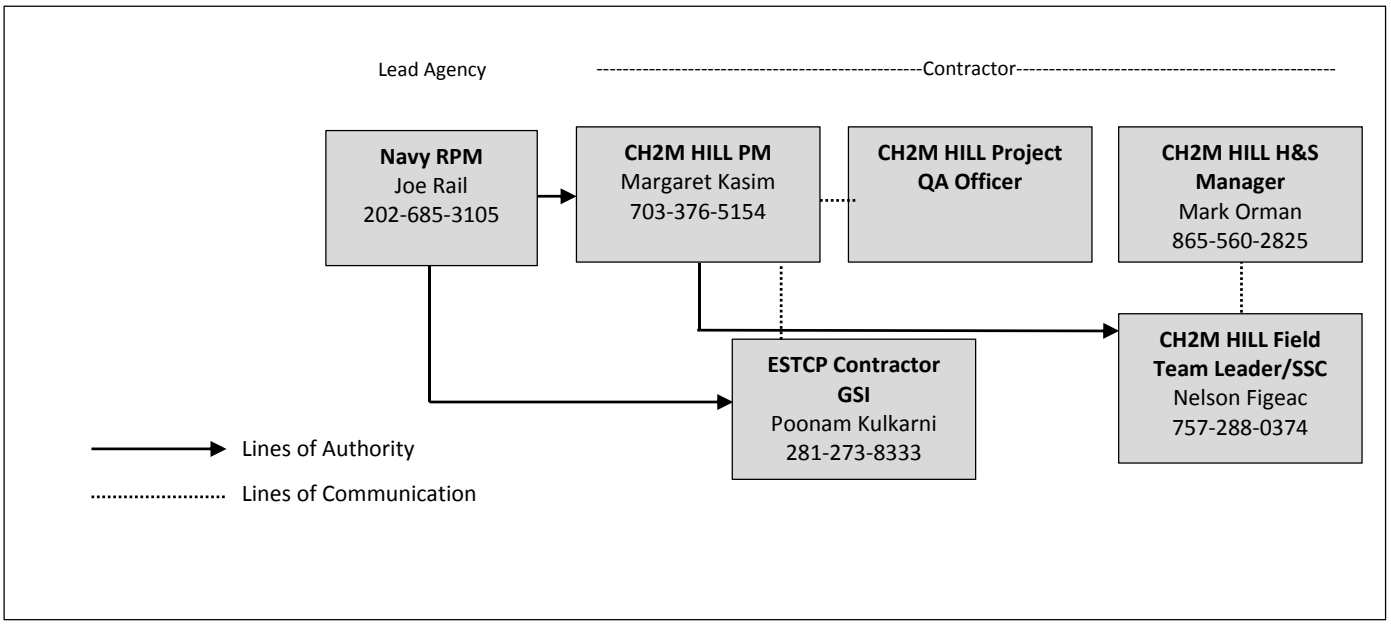
- Request the contractor to brief CH2M HILL team members on the precautions related to the contractor's work
- When an apparent contractor noncompliance or unsafe condition or practice poses a risk to CH2M HILL team members, conduct the following:
  - Notify the contractor safety representative
  - Request that the contractor determine and implement corrective actions
  - If necessary, stop affected CH2M HILL work until contractor corrects the condition or practice
  - Notify the client, PM, and RHSM as appropriate

If apparent, contractor noncompliance or unsafe conditions or practices are observed, inform the contractor safety representative (CH2M HILL's obligation is limited strictly to informing the contractor of the observation; the contractor is solely responsible for determining and implementing necessary controls and corrective actions).

If an apparent imminent danger is observed, immediately warn the contractor employee(s) in danger and notify the contractor safety representative (CH2M HILL's obligation is limited strictly to immediately warning the affected individual(s) and informing the contractor of the observation; the contractor is solely responsible for determining and implementing necessary controls and corrective actions).

All verbal health-and-safety-related communications will be documented in the project field logbook, daily reports, or other records.

4.5 Lines of Authority



SECTION 5

Standards of Conduct

All individuals associated with this project must work injury-free and drug-free and must comply with the following standards of conduct, the SSHP, and the safety requirements of CH2M HILL. Commonly accepted standards of conduct help maintain good relationships between people. They promote responsibility and self-development. Misunderstandings, frictions, and disciplinary action can be avoided by refraining from thoughtless or wrongful acts.

5.1 Standards of Conduct Violations

All individuals associated with this project are expected to behave in a professional manner. Violations of the standards of conduct would include, but not be limited to, the following:

- Failure to perform work
- Inefficient performance, incompetence, or neglect of work
- Willful refusal to perform work as directed (insubordination)
- Negligence in observing safety regulations, poor housekeeping, or failure to report on-the-job injuries or unsafe conditions
- Unexcused or excessive absence or tardiness
- Unwillingness or inability to work in harmony with others
- Discourtesy, irritation, friction, or other conduct that creates disharmony
- Harassment or discrimination against another individual
- Failure to be prepared for work by wearing the appropriate construction clothing or bringing the necessary tools
- Violation of any other commonly accepted reasonable rule of responsible personal conduct

5.2 Disciplinary Actions

The Environmental Services Business Group (ESBG) employees, employees working on ESBG projects, and subcontractor employees are subject to disciplinary action for not following HSE rules and requirements. Potential disciplinary action is equally applicable to all employees, including management and supervision. Disciplinary action may include denial of access to the worksite, warnings, reprimands, and other actions up to and including termination depending on the specific circumstances.

5.3 Subcontractor Safety Performance

CH2M HILL should continuously endeavor to observe subcontractors' safety performance and adherence to their plans and AHAs. This endeavor should be reasonable, and include observing for hazards or unsafe practices that are both readily observable and occur in common work areas. CH2M HILL is not responsible for exhaustive observation for hazards and unsafe practices. CH2M HILL oversight does not relieve subcontractors of their responsibility for effective implementation and compliance with the established plan(s).

5.3.1 Observed Hazard Form

When apparent noncompliance or unsafe conditions or practices are observed, notify the subcontractor's supervisor or safety representative verbally, and document using the Observed Hazard Form, included as **Attachment** 7 to this SSHP, and require corrective action.

If necessary, stop subcontractor's work using the Stop Work Order Form until corrective actions is implemented for observed serious hazards or conditions. Update the Observed Hazard Form to document corrective actions have been taken. The subcontractor is responsible for determining and implementing necessary controls and corrective actions.

5.3.2 Stop Work Order

CH2M HILL has the authority, as specified in the contract, and the responsibility to stop work in the event any CH2M HILL employee observes unsafe conditions or failure of the subcontractor to adhere to its safe work practices, or observes a condition or practice that may result in a release or violation of an environmental requirement. This authority and action does not in any way relieve the subcontractor of its responsibilities for the means and methods of the work or, therefore, of any corrective actions. Failure to comply with safe work practices can be the basis for restriction or removal of the subcontractor staff from the job site, termination of the subcontract, restriction from future work, or all three.

When an apparent imminent danger is observed, immediately stop work and alert all affected individuals. Remove all affected CH2M HILL employees and subcontractor staff from the danger, notify the subcontractor's supervisor or safety representative, and do not allow work to resume until adequate corrective measures are implemented. Notify the PM, contract administrator, and RHSM.

When repeated noncompliance or unsafe conditions are observed, notify the subcontractor's supervisor or safety representative and stop affected work by completing and delivering the Stop Work Order Form (attached to this SSHP) until adequate corrective measures are implemented. Consult the contract administrator to determine what the contract dictates for actions to pursue in event of subcontractor noncompliance including work stoppage, back charges, progress payments, removal of subcontractor manager, monetary penalties, or termination of subcontractor for cause.

5.4 Incentive Program

Each project is encouraged to implement a safety incentive program that rewards workers for exhibiting exemplary safety behaviors. Actions that qualify are those that go above and beyond what is expected. Actions that will be rewarded include spotting and correcting a hazard, bringing a hazard to the attention of your foreman, telling your foreman about an incident, coming up with a safer way to get the work done, or stopping a crew member from doing something unsafe. The program will operate throughout the project, covering all workers. The incentive program will be communicated to all employees during the project employee orientation and project safety meetings.

5.5 Reporting Unsafe Conditions/Practices

Responsibility for effective health and safety management extends to all levels of the project and requires good communication between employees, supervisors, and management. Accident prevention requires a proactive policy on near misses, close calls, unsafe conditions, and unsafe practices. All personnel must report any situation, practice, or condition which might jeopardize the safety of our projects. All unsafe conditions or unsafe practices will be corrected immediately. CH2M HILL has zero tolerance of unsafe conditions or unsafe practices.

No employee or supervisor will be disciplined for reporting unsafe conditions or practices. Individuals involved in reporting the unsafe conditions or practices will remain anonymous.

The following reporting procedures will be followed by all project employees:

- Upon detection of any unsafe condition or practice, the responsible employee will attempt to safely correct the condition.

- The unsafe condition or practice will be brought to the attention of the worker's direct supervisor, unless the unsafe condition or practice involves the employee's direct supervisor. If so, the SSHO needs to be notified at once by the responsible employee.
- Either the responsible employee or responsible employee's direct supervisor is responsible for immediately reporting the unsafe condition or practice to the SSHO.
- The SSHO will act promptly to correct the unsafe condition or practice.
- Details of the incident or situation will be recorded by the SSHO in the field logbook. If the subcontractor was involved, the Observed Hazard Form will be used.

SECTION 6

Safety Planning and Change Management

6.1 Daily Safety Meetings and Pre-task Safety Plans

Daily safety meetings are to be held with all project personnel in attendance to review the hazards posed and required HSE procedures and AHAs that apply for each day's project activities. The Pre-task Safety Plans (PTSPs) serve the same purpose as the general assembly safety meetings, but the PTSPs are held between the crew supervisor and their work crews to focus on hazards posed to individual work crews.

At the start of each day's activities, the crew supervisor completes the PTSP, provided as an attachment to this HSP, with input from the work crew, during their daily safety meeting. The day's tasks, personnel, tools, and equipment that will be used to perform the tasks listed, along with the hazards posed and required HSE procedures, in the HSP and AHA. The use of PTSPs promotes worker participation in the hazard recognition and control process while reinforcing the task-specific hazard and required HSE procedures with the crew each day.

6.2 Change Management

This HSP addresses all known activities and associated hazards. As work progresses, if significant changes are identified that could affect health and safety at the site, coordinate with the RHSM to determine whether an HSP update is necessary.

The following are examples of changes that may require a revision to the plan:

- Change in CH2M HILL staff
- New subcontractor to perform work
- New chemicals brought to site for use
- Change in scope or addition of new tasks
- Change in contaminants of concern (COCs) or change in concentrations of COCs
- New hazards or hazards not previously identified that are not addressed in this SSHP

6.3 Agency Inspection Guidance

(Reference CH2M HILL SOP HSE-201, *Agency Inspections and Communications*)

Agency inspections (for example, OSHA, the United States Environmental Protection Agency (EPA), or other regulatory agencies) are on the rise. CH2M HILL implements safety and environmental programs in order to ensure safety to workers, the public, and the environment. This plan addresses things like labeling containers, completing the hazard communication training using the attachments to this SSHP, listing training requirements and PPE requirements, and addressing project-specific hazards. Field personnel need to contact the RHSM to update this plan if hazards are encountered that are not addressed.

SOP HSE-201 addresses agency inspections in detail, and **Attachment 9** to this SSHP, **Target Zero Bulletin on Agency Inspections** provides a good summary of the inspection process and what to do if an agency such as OSHA or EPA shows up at the site. It is critical immediately notify the RHSM if an inspector arrives (and EM if it is environmental-related) because they can help facilitate and make additional notifications.

Review the Target Zero Bulletin and keep it with your Health and Safety Plan/Environmental Plan. Make it a topic at a safety meeting, and keep it readily available in the event of an inspection.

SECTION 7

Project Hazard Analysis and Health Hazard Control Program

(Reference: EM 385-1-1 Section 01.B.06)

The Health Hazard Control Program will be conducted by the use of the AHA process. Section 7 outlines the process that will be used by the SSHO onsite to determine the presence of hazardous environments or whether hazardous or toxic agents could be released into the work environment.

A health and safety risk analysis (Table 7-1) has been performed for each task. In the order listed below, the RHSM considers the various methods for mitigating the hazards. Employees are trained on this hierarchy of controls during their hazardous waste training and reminded of them throughout the execution of projects:

- Elimination of the hazards (use remote sampling methodology to avoid going into a confined space)
- Substitution (reduce exposure to vapors by using of a geoprobe instead of test pitting)
- Engineering controls (ventilate a confined space to improve air quality)
- Warnings (establish exclusion zones to keep untrained people away from hazardous waste work)
- Administrative controls (implement a work-rest schedule to reduce chance of heat stress)
- Use of PPE (use of respirators when action levels are exceeded)

The hazard controls and safe work practices are summarized in the following sections of this SSHP:

- General hazards and controls
- Project-specific hazards and controls
- Physical hazards and controls
- Biological hazards and controls
- Contaminants of concern

7.1 Activity Hazard Analysis

An AHA must be developed for each CH2M HILL job activity. The AHA should define the work tasks required to perform each activity, along with potential HSE hazards and recommended control measures for each hazard. A listing of the equipment to be used to perform the activity, inspection requirements to be performed, and training requirements for the safe operation of the equipment listed must be identified. Workers are briefed on the AHA before performing the work and their input is solicited prior to, during, and after the performance of work to further identify the hazards posed and control measures required. The AHA should identify the work tasks required to perform each activity, along with potential HSE hazards and recommended control measures for each hazard.

The hazard controls described in the following sections and applicable CH2M HILL core standards and SOPs should be used as a basis for preparing AHAs.

AHAs prepared for CH2M HILL activities and subcontractors are included as an attachment to this SSHP.

7.2 Subcontractor Activity Hazard Analysis

CH2M HILL subcontractors are required to provide AHAs specific to their scope of work on the project for acceptance by CH2M HILL. Each subcontractor will submit AHAs for its field activities, as defined in its scope of work, along with a project-specific safety plan and procedures. Additions or changes in field activities, equipment, tools, or material used to perform work or hazards not addressed in existing AHAs requires either a new AHA to be prepared or an existing AHA to be revised.

TABLE 7-1
General Activity Hazard Analysis

	Project Activity							
Potential Hazard	**UXO Avoidance**							
Biological Hazards	X							
Chemical Hazard	X							
Chemical Injections (remediation)	X							
Drilling	X							
Explosives Usage or Munitions Response	X							
Field Vehicles	X							
Hand & Power Tools	X							
Manual Lifting	X							
MEC/MMPEH	X							
Noise	X							
Temperature Extremes	X							
Ultraviolet Light exposure (sunburn)	X							
Utilities (underground/overhead)	X							
Vinyl Chloride	X							

SECTION 8

General Hazards and Controls

Section 8 provides safe work practices and control measures used to reduce or eliminate potential hazards. It is a summarized list of requirements. Always consult the appropriate CH2M HILL SOP to ensure all requirements are implemented.

8.1 Bloodborne Pathogens

(Reference CH2M HILL SOP HSE-202, *Bloodborne Pathogens*)

Exposure to bloodborne pathogens may occur when rendering first-aid or cardiopulmonary resuscitation (CPR), or when coming into contact with landfill waste or waste streams containing potentially infectious material (PIM).

Employees trained in first-aid/CPR or those exposed to PIM must complete CH2M HILL's 1-hour bloodborne pathogens computer-based training module annually. When performing first-aid/CPR the following apply:

- Observe universal precautions to prevent contact with blood or other PIMs. Where differentiation between body fluid types is difficult or impossible, consider all body fluids to be potentially infectious materials.
- Always wash your hands and face with soap and running water after contacting PIMs. If washing facilities are unavailable, use an antiseptic cleanser with clean paper towels or moist towelettes.
- If necessary, decontaminate all potentially contaminated equipment and surfaces with chlorine bleach as soon as possible. Use one part chlorine bleach (5.25 percent sodium hypochlorite solution) diluted with 10 parts water for decontaminating equipment or surfaces after initially removing blood or other PIMs. Remove contaminated PPE as soon as possible before leaving a work area.

CH2M HILL will provide exposed employees with a confidential medical examination should an exposure to PIM occur. The examination includes the following procedures:

- Documenting the exposure.
- Testing the exposed employee's and the source individual's blood (with consent).
- Administering post-exposure prophylaxis.

8.2 Chemical Storage

The following are general guidelines for storing chemicals and other hazardous materials:

- Keep acids away from bases.
- Keep oxidizers (nitric acid, nitrates, peroxides, chlorates) and organics away from inorganic reducing agents (metals).
- Keep flammables and corrosives in appropriate storage cabinets.
- Do not store paper or other combustibles near flammables.
- Use secondary containment and lipped shelving that is secured.
- Have a fire suppression system available.

8.2.1 Storage of Flammable/Combustible Liquids

- Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids.

- Approved safety cans shall be used for the handling and use of flammable liquids in quantities of 5 gallons (19 liters) or less. Do not use plastic gas cans.
- For quantities of 1 gallon (3.78 liters) or less, the original container may be used for storage and use of flammable liquids.
- Flammable or combustible liquids shall not be stored in areas used for stairways or normally used for the passage of people.

8.2.2 Indoor Storage of Flammable/Combustible Liquids

- No more than 25 gallons (95 liters) of flammable or combustible liquids shall be stored in a room outside of an approved storage cabinet.
- Quantities of flammable and combustible liquids in excess of 25 gallons (95 liters) shall be stored in an acceptable or approved cabinet.
- Cabinets shall be conspicuously lettered: "FLAMMABLE: KEEP FIRE AWAY."
- Not more than 60 gallons (228 liters) of flammable or 120 gallons (456 liters) of combustible liquids shall be stored in any one storage cabinet. Not more than three such cabinets may be located in a single storage area.

8.2.3 Outside Storage of Flammable/Combustible Liquids

- Storage of containers (not more than 60 gallons [228 liters] each) shall not exceed 1,100 gallons (4,180 liters) in any one area. No area shall be within 20 feet (6.1 meters) of any building.
- Storage areas shall be graded to divert spills away from buildings and surrounded by an earthen dike.
- Storage areas may not be located near a storm drain. Overflow and spills must be diverted away from storm drains or surface waters.
- Storage areas shall be free from weeds, debris, and other combustible materials.
- Outdoor portable tanks shall be provided with emergency vent devices and shall not be closer than 20 feet (6.1 meters) to any building.
- Signs indicating no smoking shall be posted around the storage area.

8.2.4 Storage of Hazardous Waste

- All facilities storing ignitable and combustible liquids and hazardous wastes must be designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any release of hazardous constituents.
- Flammable wastes should be stored more than 50 feet from the property line.

8.2.5 Storage of Chemical Injection Chemicals/Materials

When chemical injection remediation technologies are being used at a site, the following storage guidelines must be followed:

- Some injection chemicals, such as strong oxidizers, may have stringent storage requirements per local or National Fire Codes. Verify that appropriate storage provisions are in place prior to starting work.

  NOTE: Counties and cities may have requirements specific to storing these chemicals. Also, storage and use of certain chemicals such as potassium permanganate and hydrogen peroxide may be subject to the new Chemical Facility Anti-Terrorism Standards of the Department of Homeland Security—the applicability depends on the chemical, quantity/concentration, and type of facility. Please contact the project EM to determine whether chemicals are subject to these standards.

- Injection chemicals must be stored in a designated, secured area with spill prevention capabilities. Review Material Safety Data Sheet (MSDS) or other information to determine potential incompatible materials. Incompatible materials shall not be stored together. Ensure all containers are labeled.

8.3 Driving Safety

(Reference CH2M HILL HSE Policy 205, Distracted Driving – Wireless Devices, Vehicle Safety Core Standard)

All CH2M HILL employees are prohibited from using wireless devices while operating a motor vehicle when conducting company business regardless of the location or vehicle ownership and whether or not during regular working hours.

All CH2M HILL contractors and subcontractors are prohibited from using wireless devices while operating a CH2M HILL- or CH2M HILL client-owned, leased, or rented motor vehicle, or while operating any other motor vehicle on the project site.

- Prohibited use includes the following:
  - Dialing or speed dialing
  - Using a hands-free or voice-recognition (blue tooth) device to dial or speed dial
  - Engaging in conversation or listening to a conversation using a wireless device
  - Checking e-mails or surfing the Internet using a wireless device
  - Texting or e-mailing (reading, sending, or screening) with a wireless device
  - Programming or entering coordinates into a global positioning system device (following directions by a global positioning system is permitted)
  - Using a wireless device for voice recording or dictation
- Employees, contractors, and subcontractors who need to use a wireless device must pull off the road to a safe location, with the vehicle securely stopped and emergency flashers on, or wait until they reach their destination.
- Avoid distractions from mobile phones, smartphones, voice recognition systems, PDAs, notebook, tablets (or similar devices), or laptops, by turning off or silencing the wireless devices before operating a motor vehicle.

Follow the guidelines below when operating a vehicle:

- Obey speed limits, and be aware of blind spots or other hazards associated with low visibility. Practice defensive driving techniques, such as leaving plenty of room between your vehicle and the one ahead of you.
- Do not drive while drowsy. Drowsiness can occur at any time, but is most likely after 18 hours or more without sleep.
- Maintain focus on driving. Eating, drinking, smoking, and adjusting controls can divert attention from the road. Take the time to park and perform these tasks when parked rather than while driving.
- Ensure vehicle drivers are familiar with the safe operation of vehicles of the type and size to be operated. Large vehicles such as full-size vans and pick-ups have different vision challenges and handling characteristics than smaller vehicles.

8.4 Electrical Safety

(Reference CH2M HILL SOP HSE-206, *Electrical Safety*)

Below are the hazard controls and safe work practices to follow when using electrical tools, extension cords, and/or other electrical-powered equipment or when exposed to electrical hazards. Ensure the requirements of the referenced SOP are followed:

- Only qualified personnel are permitted to work on unprotected energized electrical systems.
- Only authorized personnel are permitted to enter high-voltage areas.
- CH2M HILL employees who might from time to time work in an environment influenced by the presence of electrical energy must complete Awareness Level Electrical Safety Training located on the CH2M HILL Virtual Office.
- Do not tamper with electrical wiring and equipment unless qualified to do so. All electrical wiring and equipment must be considered energized until lockout/tagout procedures are implemented.
- Inspect electrical equipment, power tools, and extension cords for damage prior to use. Do not use defective electrical equipment; remove from service.
- CH2M HILL has selected Ground Fault Circuit Interrupters (GFCIs) as the standard method for protecting employees from the hazards associated with electric shock:
  - GFCIs shall be used on all 120-volt, single-phase 15- and 20-amphere receptacle outlets that are not part of the permanent wiring of the building or structure.
- An assured equipment grounding conductor program may be required under the following scenarios:
  - GFCIs cannot be used
  - Client requires such a program to be implemented
  - Business group decides to implement program in addition to GFCI protection
- Extension cords must be equipped with third-wire grounding. Cords passing through work areas must be covered, elevated, or protected from damage. Cords should not be routed through doorways unless protected from pinching. Cords should not be fastened with staples, hung from nails, or suspended with wire.
- Electrical power tools and equipment must be effectively grounded or double-insulated and Underwriters Laboratory approved.
- Operate and maintain electric power tools and equipment according to manufacturers' instructions.
- Maintain safe clearance distances between overhead power lines and any electrical conducting material unless the power lines have been de-energized and grounded, or where insulating barriers have been installed to prevent physical contact. Maintain at least 10 feet (3 meters) from overhead power lines for voltages of 50 kilovolts (kV) or less, and 10 feet (3 meters) plus 0.4 inch (1.0 centimeter) for every 1 kV over 50 kV.
- Temporary lights shall not be suspended by their electric cord unless designed for suspension. Lights shall be protected from accidental contact or breakage.
- Protect all electrical equipment, tools, switches, and outlets from environmental elements.

8.5 Field Vehicles

- Field vehicles may be personal vehicles, rental vehicles, fleet vehicles, or project vehicles.
- Maintain a first-aid kit, bloodborne pathogen kit, and fire extinguisher in the field vehicle at all times.

- Use a rotary beacon on vehicle if working adjacent to active roadway.
- Familiarize yourself with the following rental vehicle features prior to operating the vehicle:
  - Vision fields and blind spots
  - Vehicle size
  - Mirror adjustments
  - Seat adjustments
  - Cruise control features, if offered
  - Pre-program radio stations and global positioning system, if equipped
- Always wear seatbelt while operating vehicle.
- Adjust headrest to proper position.
- Tie down loose items if utilizing a van or pick-up truck.
- Close car doors slowly and carefully. Fingers can get pinched in doors.
- Park vehicle in a location where it can be accessed easily in the event of an emergency. If not possible, carry a phone.
- Have a designated place for storing the field vehicle keys when not in use.
- Ensure back-up alarms are functioning, if equipped. Before backing a vehicle, take a walk around the vehicle to identify obstructions or hazards. Use a spotter when necessary to back into or out of an area.
- See the Vehicle Accident Guidance attached to this SSHP, if a vehicle incident is experienced in a rental or fleet vehicle.

8.6 Fire Prevention

(Reference EM 385-1-1 Section 09.A.01, and CH2M HILL SOP HSE-403, *Hazardous Material Handling*)

Follow the fire prevention and control procedures listed in the following subsection.

8.6.1 Fire Extinguishers and General Fire Prevention Practices

- Fire extinguishers shall be provided so that the travel distance from any work area to the nearest extinguisher is less than 100 feet (30.5 meters). When 5 gallons (19 liters) or more of a flammable or combustible liquid is being used, an extinguisher must be within 50 feet (15.2 meters). When 10 liters or more of a flammable or combustible liquid is being used, an extinguisher must be within 15 meters.
- Extinguishers must:
  - Be maintained in a fully charged and operable condition
  - Be visually inspected each month
  - Undergo a maintenance check each year
- The area in front of extinguishers must be kept clear.
- Post “Exit” signs over exiting doors, and post “Fire Extinguisher” signs over extinguisher locations.
- Combustible materials stored outside should be at least 10 feet (3 meters) from any building.
- Solvent waste and oily rags must be kept in a fire resistant, covered container until removed from the site.
- Keep areas neat. Housekeeping is important.

- A fire extinguisher, rated not less than 2A, shall be provided for each 280 square meters of a combustible building area, or major fraction thereof. Travel distance from any point of the protection area to the nearest fire extinguisher shall not exceed a horizontal distance of 50 feet or 15 meters.
- Flammable/combustible liquids must be kept in approved containers, and must be stored in an approved storage cabinet.

Fire extinguishers can represent an important segment of any overall fire protection program. However, their successful functioning depends upon the following conditions having been met:

- The extinguisher is properly located and in working order.
- The extinguisher is of proper type and for a fire which may occur.
- The fire is discovered while still small enough for the extinguisher to be effective.
- The fire is discovered by a person ready, willing, and able to use the extinguisher.
- Class C fires (see below for fire classifications) can be readily extinguished by quenching-cooling with water or a water-mixture agent. Class B fires are more effectively extinguished by an agent that blankets-smothers the fire through exclusion of oxygen surrounding the fire area. Those extinguishers containing bromochlorodifluoromethane, monobromotrifluoromethane, carbon dioxide, or dry chemical are generally best suited for extinguishing Class B fires. For Class C fires, the primary consideration in extinguishing this type of fire is the selection of nonconductive extinguishing agent to prevent dangerous electrical shock and possible death to user.
- Due to its corrosive nature, dry chemical is not recommended for use on computerized, electronic, or other equipment with extensive circuitry.
- The following chart defines/explains classes of fires:

A		Common Combustibles	Wood, paper, cloth etc.
B		Flammable liquids and gases	Gasoline, propane and solvents
C		Live electrical equipment	Computers, fax machines (see note!)
D		Combustible metals	Magnesium, lithium, titanium
K		Cooking media	Cooking oils and fats

Fires are classified into five groups:

- Class A: Class A fires involve common combustibles such as wood, paper, cloth, rubber, trash, and plastics. They are common in typical commercial and home settings, but can occur anywhere these types of materials are found.
- Class B: Class B fires involve flammable liquids, gases, solvents, oil, gasoline, paint, lacquers, tars, and other synthetic or oil-based products. Class B fires often spread rapidly and, unless properly secured, can reflash after the flames are extinguished.
- Class C: Class C fires involve energized electrical equipment, such as wiring, controls, motors, data processing panels, or appliances. They can be caused by a spark, power surge, or short circuit and typically occur in locations that are difficult to reach and see.

- Class D: Class D fires involve combustible metals such as magnesium and sodium. Combustible metal fires are unique industrial hazards that require special dry powder agents.

(NOTE: Although ABC and BC dry chemical extinguishers can control a fire involving electronic equipment, the National Fire Code specifically advises against dry-chemical extinguishers for fires involving computers or other delicate electronic equipment due to the potential damage from residues).

Firefighting shall only be conducted by those trained and certified in this practice. The commonly accepted practice is the PASS method. This means, pull the pin, aim, squeeze the handle, and sweep the base of the fire area. The SSHO shall verify that at least two staff members are onsite that have the required training for use of fire extinguishers.

8.6.2 Dispensing of Flammable/Combustible Liquids

- Areas in which flammable or combustible liquids are dispensed in quantities greater than 5 gallons (22.7 liters) (shall be separated from other operations by at least 25 feet (7.6 meters).
- Drainage away from storm drains or surface waters or other means of containment shall be provided to control spills.
- Adequate natural or mechanical ventilation shall be provided to maintain the concentration of flammable vapor at or below 10 percent of the lower flammable limit.
- Dispensing of flammable liquids from one container to another shall be done only when containers are electrically interconnected (bonded).
- Dispensing flammable or combustible liquids by means of air pressure on the container or portable tanks is prohibited.
- Dispensing devices and nozzles for flammable liquids shall be of an approved type.

8.7 General Practices and Housekeeping

The following are general requirements applicable to all portions of the work:

- Site work should be performed during daylight hours whenever possible.
- Good housekeeping must be maintained at all times in all project work areas.
- Common paths of travel should be established and kept free from the accumulation of materials.
- Keep access to aisles, exits, ladders, stairways, scaffolding, and emergency equipment free from obstructions.
- Provide slip-resistant surfaces, ropes, or other devices to be used.
- Specific areas should be designated for the proper storage of materials.
- Tools, equipment, materials, and supplies shall be stored in an orderly manner.
- As work progresses, scrap and unessential materials must be neatly stored or removed from the work area.
- Containers should be provided for collecting trash and other debris and shall be removed at regular intervals.
- All spills shall be quickly cleaned up; oil and grease shall be cleaned from walking and working surfaces.
- Review the safety requirements of each job you are assigned to with your supervisor. You are not expected to perform a job that may result in injury or illness to yourself or to others.
- Familiarize yourself with, understand, and follow jobsite emergency procedures.

- Do not fight or horseplay while conducting the firm's business.
- Do not use or possess firearms or other weapons while conducting the firm's business.
- Report unsafe conditions or unsafe acts to your supervisor immediately.
- Report emergencies, occupational illnesses, injuries, vehicle accidents, and near misses immediately.
- Do not remove or make ineffective safeguards or safety devices attached to any piece of equipment.
- Report unsafe equipment, defective or frayed electrical cords, and unguarded machinery to your supervisor.
- Shut down and lock out machinery and equipment before cleaning, adjustment, or repair. Do not lubricate or repair moving parts of machinery while the parts are in motion.
- Do not run in the workplace.
- When ascending or descending stairways, use the handrail and take one step at a time.
- Do not apply compressed air to any person or clothing.
- Do not wear steel taps or shoes with metal exposed to the sole at any CH2M HILL project location.
- Do not wear finger rings, loose clothing, wristwatches, and other loose accessories when within arm's reach of moving machinery.
- Remove waste and debris from the workplace and dispose of in accordance with federal, state, and local regulations.
- Note the correct way to lift heavy objects (secure footing, firm grip, straight back, lift with legs), and get help if needed. Use mechanical lifting devices whenever possible.
- Check the work area to determine what problems or hazards may exist.

8.8 Hazard Communication

(Reference Section 01.B.06, EM 385-1-1 and CH2M HILL SOPs HSE-107, *Hazard Communication* and HSE-403, *Hazardous Material Handling*)

The hazard communication coordinator is to perform the following:

- Effective information and training on hazardous chemicals shall be given to project employees by their employer at the time of initial assignment and/or whenever a new physical or health hazard the employees have not been previously trained about is introduced into their work area.
- Complete an inventory of chemicals brought onsite by CH2M HILL using the chemical inventory form included as an attachment to this SSHP.
- Confirm that an inventory of chemicals brought onsite by CH2M HILL subcontractors is available.
- Request or confirm locations of MSDSs from the client, contractors, and subcontractors for chemicals to which CH2M HILL employees potentially are exposed.
- Before or as the chemicals arrive onsite, obtain an MSDS for each hazardous chemical and include on the chemical inventory sheet (attached to this SSHP) and add the MSDS to the MSDS attachment section of this plan.
- Label chemical containers with the chemical name and with hazard warnings, and store properly.
- Give employees required chemical-specific hazardous communication training using the chemical-specific training form included as an attachment to this SSHP.

- Store all materials properly, giving consideration to compatibility, quantity limits, secondary containment, fire prevention, and environmental conditions.

8.9 Knife Use

Open-bladed knives (for example, box cutters, utility knives, pocket knives, machetes, and multi-purpose tools with fixed blades such as a Leatherman™) are prohibited at worksites, except where the following three conditions are met:

- The open-bladed knife is determined to be the best tool for the job.
- An approved AHA or written procedure is in place and covers the necessary safety precautions (work practices, PPE, and training).
- Knife users have been trained and follow the AHA.

8.10 Lighting

Lighting shall be evaluated when conducting work inside buildings, confined spaces, or other areas/instances where supplemental light may be needed (for example, work before sunrise or after sunset). A light meter can be used to evaluate the adequacy of lighting. The following are common requirements for lighting and the conditions/type of work being performed:

- While work is in progress outside construction, areas shall have at least 33 lux.
- Construction work conducted inside buildings should be provided with at least 55 lux light.
- The means of egress shall be illuminated with emergency and non-emergency lighting to provide a minimum 11 lux measured at the floor. Egress illumination shall be arranged so that the failure of any single lighting unit, including the burning out of an electric bulb, will not leave any area in total darkness.

8.11 Manual Lifting

(Reference CH2M HILL SOP HSE-112, *Manual Lifting*)

Back injuries are the leading cause of disabling work and most back injuries are the result of improper lifting techniques or overexertion. Use the following to mitigate the hazards associated with lifting:

- When possible, the task should be modified to minimize manual lifting hazards.
- Lifting of loads weighing more than 40 pounds (18 kilograms) shall be evaluated by the SC using the Lifting Evaluation Form contained in SOP HSE-112.
- Using mechanical lifting devices is the preferred means of lifting heavy objects such as forklifts; cranes, hoists, and rigging; hand trucks; and trolleys.
- Personnel shall seek assistance when performing manual lifting tasks that appear beyond their physical capabilities.
- In general, the following steps must be practiced when planning and performing manual lifts: Assess the situation before you lift; ensure good lifting and body positioning practices; and ensure good carrying and setting down practices.
- All CH2M HILL workers must have training in proper manual lifting training either through the New Employee Orientation or through Manual Lifting module located on the Virtual Office.

8.12 Personal Hygiene

Good hygiene is essential for personal health and to reduce the potential of cross-contamination when working on a hazardous waste site. Implement the following:

- Keep hands away from nose, mouth, and eyes during work.
- Keep areas of broken skin (chapped, burned, etc.) covered.
- Wash hands with soap and water prior to eating, smoking, or applying cosmetics.

8.13 Personal Security

Follow the guidelines below for personal security measures. The RHSM and Firm-Wide Security Office can be contacted if additional, specific measures are needed (such as evaluating the needs for security service).

8.13.1 General Safety and Security Guidelines

The CH2M HILL Corporate Security Department recommends the following guidelines for workers in the United States:

- Stay alert and be aware of your surroundings. Avoid pre-occupations with mobile devices, while in an unfamiliar area.
- Whenever possible, use the buddy system with another employee or client or subcontractor employee.
- Trust your intuition; if a situation appears strange or wrong, it probably is.
- Be confident in your walk or stride; do not give the appearance you are new in town.
- Avoid carrying and displaying large sums of cash.
- If you sense or see dangerous situations along your route, change your route and depart the area quickly. If you feel that you are being followed, go to the nearest police station or safe location and file a complaint with the police. Provide a description of the person, their vehicle, license plate number, and any other useful information.
- Only walk short distances that are safe and secure while visiting an unfamiliar city or location.
- Take host-approved transportation for long distances.
- “Fight or Flight?” Leaving the possible or dangerous area is always better than staying to fight.
- Always report suspicious activity to the nearest local law enforcement agency.
- Locate emergency exits in your hotel or where you are staying to ensure you know where to go in case of a fire or a natural or man-made disaster.
- Secure your electronic devices when left in your room or take them with you if you are not able to secure them properly.
- If you feel your life is in danger, call 911. Be sure to speak clearly, concisely, and give the dispatcher a good description of where you are physically located.

8.13.2 Operating or Riding in Vehicles

- When waiting for public transportation or a taxi, remain in a store or restaurant as long as possible before catching your ride and never wait by yourself in an isolated area.
- Approach your vehicle with keys firmly in your hand and ready to unlock the car.
- Quickly check your car before entering it to determine damage or presence of an intruder.
- Vulnerable times can be stopping to find your keys to enter your vehicle or stepping out of your vehicle in an isolated area. Be aware of your surroundings before you perform these activities.
- Always keep your doors locked during transit and when the vehicle is parked.
- Never leave your vehicle unlocked, even when performing a quick task such as checking in at a hotel, getting gas, or going picking up food.

- If confronted by an individual inside a vehicle pointing a weapon at you, run the opposite way from where the vehicle is facing and scream as loud as you can. This evasive action will probably cause the individual to drive away.
- If an individual in a passing car points at your tires or engine to indicate a malfunction, only pull over in a well-lit and populated gas or rest stop. Never pull over in an isolated or dimly lit area. You may have a malfunction or the passing motorist may be attempting to rob you.
- Always park your vehicle in a well-lit and secure area. If your vehicle is parked in a dimly lit or isolated area in a parking garage; ask an attendant or friend to accompany you to your vehicle.
- Secure your valuables in the trunk, or place them out of sight or cover them with a blanket or coat if there is no secure storage area in the vehicle. The would-be-perpetrator likes to see what to steal and not knowing what you have concealed will normally prevent a break in.

8.13.2.1. Riding in a Taxi

- Have your host or a designated travel agent suggest or reserve a reputable taxi service for you during your stay.
- Only use a taxi service that was vetted for safety and reliability.
- If possible, place luggage, laptop, and personal belongings inside the taxi.
- When you first enter the taxi, check the driver's photo identification card, normally located on the driver's visor, with the driver to ensure they match.

8.13.2.2. Walking

- If you experience automotive trouble, remain inside the locked vehicle and call for assistance.
- If you can't reach assistance through a mobile phone, only walk for help in a safe area facing the traffic.
- If while walking you are shadowed or followed by a vehicle, run back in the direction of your vehicle and enter the vehicle if possible. File a police report on the incident as soon as practicable.
- Be aware of your surroundings and those around you while walking, and do not be distracted by using electronic devices.
- Regularly change your route if you are walking to and from meetings or conferences, and choose only well-lit areas in which to walk at night.
- If walking long distances, identify a safe house, shop, store, or restaurant to duck into if confronted by a perpetrator.

8.13.2.3. Jogging or Running

- Always jog or run in an area that is safe, secure, and used for exercising.
- Avoid running along busy roads or highways.
- If you choose to venture out on a jog or run, check the route by vehicle prior to beginning to exercise.
- Let the host or a friend know when you leave, when you plan to return, and the route you will take during exercising.
- Take a photo identification and mobile phone with you for emergencies.
- Avoid physically over-extending yourself since reflexes and decision making ability can be impaired.

8.13.2.4. Clothing and Jewelry

- Dress to blend in with locals, maintain a low profile, and avoid drawing attention to yourself.
- Travel with inexpensive clothing and jewelry.

- Avoid wearing CH2M HILL distinctive clothing or using CH2M HILL logos on luggage or laptops.

8.13.2.5. Emergency Numbers and Information

- Leave your itinerary and emergency contact numbers where you can be reached with family members and only those that have a need to know.
- Pre-program emergency numbers in the mobile device you are traveling with.
- Carry a list of current medications and specific doses in your purse or wallet.
- Record medical emergency information on a document that can be readily available if you are unable to speak or unconscious.
- Have a photocopy of your driver's license, passport, and credit card information separately in case your wallet or purse is stolen.

8.14 Shipping and Transportation of Hazardous Materials

(Reference CH2M HILL SOP HSE-417, *Hazardous Materials Transportation*)

The U.S. Department of Transportation (DOT) has specific regulations governing shipping of hazardous materials (also called dangerous goods). Chemicals brought to the site might be defined as hazardous materials by the U.S. DOT. Hazardous wastes that may be shipped offsite are also defined as hazardous materials by U.S. DOT. Other wastes may also be U.S. DOT hazardous materials. To confirm whether a material or a waste is a U.S. DOT hazardous material, check with the ESBG Waste Coordinator (Lisa Schwan/ATL), the project EM, or the CH2M HILL Dangerous Goods Shipping Coordinators (John Blasco/BAO or Rob Strehlow/MKW).

All staff who are involved in shipment of hazardous materials, including receiving hazardous materials, preparing profiles or manifests, packaging hazardous wastes, labeling, or transporting hazardous materials by road, are called HazMat employees (note CH2M HILL cannot transport hazardous wastes by public road). HazMat employees must receive CH2M HILL online training in shipping dangerous goods. CH2M HILL's online Dangerous Goods Shipping course can be found on the HSSE area of the Virtual Office.

All hazardous materials that are shipped (for example, by Federal Express) or are transported by road must be properly identified, labeled, packed, and documented by trained staff. If the material is a product that is being shipped (for example, calibration gas), use the HazMat ShipRight tool on the CH2M HILL Virtual Office (under Company Resources – Online Shipping). Contact the Dangerous Goods Shipping coordinators, the ESBG Waste Coordinator, or the project EM for additional information.

49 CFR 172 requires that all hazmat employees be aware of potential transportation security concerns. Hazardous materials security is addressed in CH2M HILL's Hazardous Materials SOP (HSE-403). The following points are provided as an overview of security measures to increase awareness of this important matter:

- It is essential that each employee understand the security risks involved with transporting hazardous materials.
- All transporters of hazardous materials must be prequalified by a contract administrator who evaluates the carrier's safety rating, security measures, and employee screening procedures.
- When shipping hazardous materials, check driver's credentials and ask about shipping details.
- When receiving a hazardous materials shipment, inspect packages for signs of tampering or damage to the contents. Verify the drivers and company information on the form with the driver.
- If there is suspicious or unusual behavior (for example, driver without credentials, evasive answers) or any discrepancies identified, do not offer or accept the shipment, and immediately notify the PM or the RHSM.

Employees responsible for shipping hazard materials must also review the CH2M HILL Transportation Security Plan (HSE-417 Appendix A).

8.15 Substance Abuse

(Reference CH2M HILL SOP HSE-105, *Drug-Free Workplace)*

Employees who work under the influence of controlled substances, drugs, or alcohol may prove to be dangerous or otherwise harmful to themselves, other employees, clients, the company, the company's assets and interests, or the public. CH2M HILL does not tolerate illegal drug use, or any use of drugs, controlled substances, or alcohol that impairs an employee's work performance or behavior.

Prohibitions onsite include the following:

- Use or possession of intoxicating beverages while performing CH2M HILL work.
- Abuse of prescription or nonprescription drugs.
- Use or possession of illegal drugs or drugs obtained illegally.
- Sale, purchase, or transfer of legal, illegal, or illegally obtained drugs.
- Arrival at work under the influence of legal or illegal drugs or alcohol.

Drug and/or alcohol testing is applicable under CH2M HILL Constructors, Inc., and munitions response projects performed in the United States. In addition, employees may be required to submit to drug and/or alcohol testing as required by clients. When required, the testing is performed in accordance with SOP HSE-105, Drug-Free Workplace. Employees who are enrolled in drug or alcohol testing are required to complete annual training located on the CH2M HILL Virtual Office.

8.16 Unknown or Suspect Objects/Materials

If unknown or suspect objects/materials are encountered (that is, exposed or partially buried drums, biological waste, cylinders, munitions of explosive concern, and unexpected stained/discolored soil) are encountered during site operations, ongoing activities shall be immediately suspended. CH2M HILL or subcontractor personnel encountering unknown or suspect objects/materials shall adhere to the following:

- Secure the area and identify the location of the object/material to the extent possible, without causing bodily injury to yourself or others and without disturbing the object.
- Evacuate the work area.
- Immediately notify the PM/HSM of the encountered condition.
- Do not provide additional disturbance or otherwise handle the suspect object/material.

The site supervisor or SC shall contact the PM and the HSM to evaluate potential hazards associated with the specific situation encountered. The project team will then address the need for the use of special procedures, engineering controls, PPE, or specialized subcontract personnel to safely mitigate the situation.

SECTION 9

Project-specific Hazard Controls

Section 9 provides safe work practices and control measures used to reduce or eliminate potential hazards. The practices and controls are to be implemented by the party in control of either the work or the particular hazard. Each person onsite is required to abide by the hazard controls. Always consult the appropriate CH2M HILL SOP to ensure all requirements are implemented. CH2M HILL employees and subcontractors must remain aware of the hazards affecting them regardless of who is responsible for controlling the hazards. CH2M HILL employees and subcontractors who do not understand any of these provisions should contact the RHSM for clarification.

9.1 Chemical Injections

The remedial action objectives for this project will be facilitated via the subsurface injection of two test materials, 1) Silica gel and 2) a mixture of silica gel and EVO. The injection points will be installed by DPT rig/HSA, and the injection by a trailer mounted injection system by a client contractor. Where these chemical injection transmissivity reduction technologies are engaged within the site target areas, the procedures and handling practices identified below must be implemented. Chemical/compound-specific hazards and controls associated with the silica gel/EVO injection are discussed after these general bullets. The client contractor will brief our UXO representative on hazards associated with working in vicinity of these compounds. The following is provided for informational purposes only for our staff to recognized hazards.

9.1.1 Pre-injection

- Review the MSDSs for the materials which are expected to be utilized in the chemical injection processes for this contract task order and:
  - Document training in accordance with the Hazard Communication section of this plan.
  - Ensure that appropriate spill response materials are present (for example, absorbent media for oil, neutralizing agents for potassium permanganate, secondary containment for larger chemical tanks).
- Evaluate potential for “daylighting” of chemical injection in the work area:
  - Evaluation should identify known or potential pathways such as existing monitoring wells screened at the same depth interval as the planned injection, wells that were not properly abandoned, and utility corridors.
  - Identify potential surface release areas such as nearby sensitive areas (for example, wetlands) storm drains, ditches, or streams, and ensure that mitigation measures are in place (for example, temporarily blocking storm sewer drains).
  - Contact the project EM for assistance in identifying release scenarios and mitigation measures.

9.1.2 Injection Operations

- Operate and maintain pressure vessels, pumps and hosing in accordance with the manufacturer’s recommendations.
- Do not exceed the rated pressure of the vessels and associated piping or hoses of the system.
- The system must be provided with a pressure relief valve/controller that safely reduces the system pressure to within the system rated pressure.
- The pressure relief valve must be rated at no more than 110 percent the rated pressure of the system and must be tested at regular intervals.

- Each vessel must be equipped with a functioning pressure gauge to monitor pressure.
- For PPE and air monitoring requirements, refer to the PPE section and Site Monitoring section of this plan. PPE shall be used to minimize potential exposure to identified site contaminants of concern and injection solutions during site injection operations. In addition, good personal hygiene practices and procedures must be practiced.
- Use face shields in combination with safety glasses or goggles when the potential for exposure to chemical splashes may exist.
- If repairs to injection delivery system components are necessary after the subsurface injection operations have been initiated, the injection lines must be relieved of pressure and drained before conducting repair work. See also the lockout/tagout section of this SSHP.
- EVO drums shall be moved using a drum “dolly” or other appropriate material handling equipment where the weight of the drum can be properly managed and secured during the movement.
- Empty EVO containers may require special preparation/rinsing prior to disposal. Verify requirements with the project Environmental Manager.
- Only qualified personnel, by prior training or experience, may operate the injection system delivery components/array(s).
- Appropriate spill response materials for all chemicals must be present at the job site. Only qualified (by training and previous experience) who have proper PPE and equipment available shall provide spill response operations.
- Station a portable eye wash in the immediate work area where chemical injections are occurring, along with wash facilities for hygienic practices and PPE decontamination.
- If PPE becomes saturated and may potentially impact work clothing, dermal surfaces, or mucous membranes, change PPE immediately.
- Verify the competency and integrity of the chemical injection hoses/piping and connection points
- Confirm hose/piping rated for 100 psi (grout to be injected at 3.8 to 38 psi).
- Verify that any cam-lock fitting on the injection hose/piping, well head, or direct-push technology (DPT) rods are structurally sound and free of defects. Where hoses are used, ensure fittings have been secured to the hose surface via mechanical banding equipment to prevent whipping.
- When injecting under pressure, stand at a sufficient distance (that is, around 20 feet) from the injection well head/point. Keep unessential project personnel away from the injection system, array, and well head(s) during injection operations.
- Remove/stow all unnecessary equipment and material in the area.
- The injection system/array must be monitored/attended at all times during the injection process and when not in use, components must be properly secured, de-energized, or stowed. If the system will operate without an attendant, plans for operating unattended must be in place an approved by the PM an HSM/EM.
- All pressured lines and fittings should be ‘tethered’ or otherwise secured to minimize whipping or ‘launching’ of lines in the event of an equipment failure. Any “quick connect” type fittings (compressed air or fluid) should be secured with appropriate pins, clips to prevent accidental disengagement of the fitting during operation.
- Inspect all equipment, hoses, pressure lines, and fittings daily and prior to pressurizing.

9.1.3 Chemical Storage

- Some injection chemicals, such as strong oxidizers, may have stringent storage requirements per local or National Fire Codes. Verify that appropriate storage provisions are in place prior to starting work.
- NOTE: Counties and cities may have requirements specific to storing these chemicals. Also, storage and use of certain chemicals such as potassium permanganate and hydrogen peroxide may be subject to the new Chemical Facility Anti-Terrorism Standards of the Department of Homeland Security—the applicability depends on the chemical, quantity/concentration, and type of facility. Please contact the project Environmental Manager to determine whether chemicals are subject to these standards.
- EVO must be stored in a designated, secured area with spill prevention capabilities. Review MSDS or other information to determine potential incompatible materials. Incompatible materials shall not be stored together. Ensure all containers are labeled.

9.1.4 Substrates That Create Reducing Conditions To Facilitate Bioremediation

Materials such as emulsified vegetable oil (EVO) or emulsified oil substrate (EOS), lactate, and cheese whey are commonly used as the electron donors or "fuel" during enhanced reductive dechlorination treatment. Enhanced reductive dechlorination can be an effective method for degrading various chlorinated solvents dissolved in groundwater.

Addition of these "electron donors" can also cause changes that need to be recognized and monitored, such as production of gases such as methane and hydrogen sulfide, and increases in carcinogenic byproducts, such as vinyl chloride, in groundwater or in the vadose zone. The gases or byproducts are not yet formed during the injection work, but are observed weeks following the injections as the biological process take place. The hazards must be considered during subsequent groundwater sampling activities. The air monitoring protocol and action levels, as well as required PPE, are discussed in later sections of this HSP.

Although EVO is food-grade material, MSDSs for the material must be kept onsite, as well as added to the chemical inventory, and specific training on hazards conducted and documented in the attachments in this HSP.

The Clean Water Act requires a Spill Prevention, Control, and Countermeasures Plan for storage of more than 1,320 gallons of oil (including EVO and EOS) in greater than or equal to 55-gallon aboveground containers. Additionally, spill kits/materials capable of stopping the spread of a leak/spill must be available and accessible. Involve your EM for assistance to determine whether a plan is required, to prepare a Spill Prevention, Control, and Countermeasures Plan, or to plan for spill control if EVO or other oils will be used around a body of water.

The following hazards must be acknowledged and addressed in the injection AHA:

- Slips/falls resulting from spilled EVO
- Slips/trips/falls from hoses transporting EVO and water
- Pressure in the injection lines (less than 20 pounds per square inch)
- Potential for oil to spray on face/body if there's a breach or leak (refer to bullets above for mitigation measures)
- Hazards associated with the mixing and injection process such as electrical hazards associated with the pump, hand contact hazards during the mixing process, spills, etc.
- Other hazards applicable to the injection process.

9.2 Drilling Safety

(Reference CH2M HILL SOP HSE-204, *Drilling*)

The following are the hazard controls and safe work practices to follow when working around or performing drilling. Ensure the requirements in the referenced SOP are followed.

- The drill rig is not to be operated in inclement weather.
- The driller is to verify that the rig is properly leveled and stabilized before raising the mast.
- Personnel should be cleared from the sides and rear of the rig before the mast is raised.
- The driller is not to drive the rig with the mast in the raised position.
- The driller must check for overhead power lines before raising the mast. Maintain a minimum distance of 10 feet (3 meters) between mast and overhead lines (less than 50 kV) and an additional 0.4 inch for every 1 kV over 50 kV. Verify the voltage of nearby overhead power lines to determine the minimum distance.
- If the project site is suspected of munitions or explosives of concern (MEC) contamination, requirements of the *Explosives Usage and Munitions Response (MR)* SOP HSE-610 shall be followed. MECs include unexploded ordnance (UXO), discarded military munitions, materials that present a potential explosive hazard, chemical warfare materials, munitions constituents, and contaminated soil or groundwater. Down-hole avoidance support may be required to prevent accidental contact with UXO. Safety requirements will be based on the risk assessment identified within the MR (safety) ORE.
- Personnel should stand clear before rig startup.
- The driller is to verify that the rig is in neutral when the operator is not at the controls.
- Become familiar with the hazards associated with the drilling method used (cable tool, air rotary, hollow-stem auger, etc.).
- Do not wear loose-fitting clothing, watches, etc., that could get caught in moving parts.
- Do not smoke or permit other spark-producing equipment around the drill rig.
- The drill rig must be equipped with a kill wire or switch, and personnel are to be informed of its location.
- Be aware and stand clear of heavy objects that are hoisted overhead.
- The driller is to verify that the rig is properly maintained in accordance with the drilling company's maintenance program.
- The driller is to verify that all machine guards are in place while the rig is in operation.
- The driller is responsible for housekeeping (maintaining a clean work area).
- The drill rig should be equipped with at least one fire extinguisher.
- If the drill rig comes into contact with electrical wires and becomes electrically energized, do not touch any part of the rig or any person in contact with the rig, and stay as far away as possible. Notify emergency personnel immediately.
- Use the drilling self-assessment checklist attached to this SSHP to evaluate drilling operations.

9.3 Hand and Power Tools

(Reference CH2M HILL, SOP HSE-210, *Hand and Power Tools*)

The following are the hazard controls and safe work practices to follow when personnel or subcontractors are using hand and power tools. Ensure the requirements in the referenced SOP are followed:

- Tools shall be inspected prior to use and damaged tools will be tagged and removed from service.
- Hand tools will be used for their intended use and operated in accordance with manufacturer's instructions and design limitations.
- Maintain all hand and power tools in a safe condition.
- Use PPE (such as gloves, safety glasses, earplugs, and face shields) when exposed to a hazard from a tool.
- Do not carry or lower a power tool by its cord or hose.
- Portable power tools will be plugged into GFCI protected outlets.
- Portable power tools will be Underwriters Laboratories listed and have a three-wire grounded plug or be double insulated.
- Disconnect tools from energy sources when they are not in use, before servicing and cleaning them, and when changing accessories (such as blades, bits, and cutters).
- Safety guards on tools must remain installed while the tool is in use and must be promptly replaced after repair or maintenance has been performed.
- Store tools properly in a place where they will not be damaged or come in contact with hazardous materials.
- If a cordless tool is connected to its recharge unit, both pieces of equipment must conform strictly with electrical standards and manufacturer's specifications.
- Tools used in an explosive environment must be rated for work in that environment (that is, intrinsically safe, spark-proof, etc.).
- Working with manual and pistol-grip hand tools may involve highly repetitive movement, extended elevation, constrained postures, and/or awkward positioning of body members (for example, hand, wrist, arm, shoulder, neck, etc.). Consider alternative tool designs, improved posture, the selection of appropriate materials, changing work organization, and sequencing to prevent muscular, skeletal, repetitive motion, and cumulative trauma stressors.

9.3.1 Machine Guarding

- Ensure that all machine guards are in place to prevent contact with drive lines, belts, chains, pinch points, or any other sources of mechanical injury.
- Unplugging jammed equipment will only be performed when equipment has been shut down, all sources of energy have been isolated and equipment has been locked/tagged and tested.
- Maintenance and repair of equipment that results in the removal of guards or would otherwise put anyone at risk requires lockout of that equipment prior to work.

9.4 Avoidance of Munitions and Explosives of Concern (MEC) and/or Material Potentially Presenting an Explosive Hazard

(Reference CH2M HILL, SOP HSE-610, Explosives Usage and Munitions Response)

During site operations, there is the potential of encountering munitions and explosives of concern (MEC) or material potentially presenting an explosive hazard (MPPEH). The primary hazard associated with exposure to a MEC/MPPEH item is the possibility of severe injury or fatality as a result of an unplanned detonation or ignition of an item if it is intentionally handled, unintentionally disturbed or when detonated/ignited from stray electro-magnetic sources. In the event that a potentially MEC/MPPEH item is discovered, it will be avoided and the following minimum procedures shall be executed:

1. **Immediately Stop Work (RECOGNIZE)**.

   RECOGNIZE: *Do not disturb or move the item, as munitions can become very unstable over time. They can detonate with movement or sometimes due to ground vibration or a stray electro-magnetic source.* MEC/MPPEH *can be present in all shapes, sizes colors or as items not normally considered a hazard (i.e. flares, soil with propellant etc). It must also be recognized that exposure to weather and time can alter or remove identification markings. Do not transmit on a radio within 150 feet of the suspect* MEC/MPPEH *item.*

2. **Secure area/location** where the MEC/MPPEH item is discovered **(RETREAT)**.

   RETREAT*: Stop and secure any operating equipment to the extent possible. Mark the general area/location of the* MEC/MPPEH *hazard with tape, colored cloth, or colored ribbon. If available, attach the marker to a branch, structure or other existing object so that it is about 3 feet (.9 m) off the ground and visible from all approaches. Place the marker no closer than the point where you first recognized the* MEC/MPPEH *hazard and DO NOT drive stakes into the ground or otherwise disturb the surface. Leave by the same route you entered the area if possible. Clear site of all workers and secure from unauthorized entry.*

   Do not transmit any radio/cellular phone frequencies unless maximum fragmentation distances separation distances are established for the suspected type of MEC/MPPEH *discovered. Signals transmitted from items such as cell phones, short-wave radios, single side-band radios or other communications and navigation devices may detonate the* MEC/MPPEH *item.*

3. **Immediately make notification to Client (REPORT).**

   REPORT*: Once area has been evacuated, appropriate notifications shall be made immediately. Provide as much information as possible, including location, approximate size, shape, color, and any other distinguishing features such as nomenclature or wiring, fins, etc.*

The following actions will be taken if MEC/MPPEH are found:

- Personnel who are not UXO-qualified will note the area of concern, and leave the immediate vicinity. They WILL NOT touch, move, or otherwise disturb the item.
- Immediately upon locating any suspect MEC, the UXO Escort will be notified. In turn, the UXO Escort will notify the Project Manager who will then provide required notifications to the client.
- Operations in the immediate area of the suspect MEC will be halted, until authorization to proceed is received from the Project Manager.

MEC Avoidance Activities

MEC avoidance is required for several of the non-intrusive activities described in this work plan. MEC avoidance activities may include visual observation of the ground surface by a UXO technician prior to and during non-intrusive tasks. When the ground is obstructed and as required, a UXO technician may augment the visual inspection with a handheld magnetometer (Schonstedt Ga-52Cx or equivalent).

9.5 Slips, Trips and Falls

9.5.1 General

- Institute and maintain good housekeeping practices.
- Designate foot traffic paths in and out of sites, when necessary, to ensure paths are kept free from slip, trip, and fall hazards or to deter personnel from taking "shortcuts" where slip, trip, hazards may be.
- Mitigate icy conditions by keeping foot traffic paths clear of ice and snow.
- Watch footing as you walk to avoid trip hazards, animal holes, or other obstacles, especially in tall grassy areas.

9.5.2 Muddy Conditions

- Muddy conditions present a slipping hazard. Use mats or other similar surface to work from if footing cannot be stabilized.
- Take shortened steps across muddy areas.
- Use a walking staff or other similar means to assist with balance.

9.5.3 Steep Slopes/Uneven Ground/Rock and Vertical Slopes

- Be aware that escarpments can slough. Avoid these areas.
- Exercise caution in relying on rocks and trees/tree stumps to support yourself—many times they are loose.
- Whenever possible, switchback your way up/down steep areas, and maintain a slow pace with firm footing.
- Employees walking in ditches, swales and other drainage structures adjacent to roads or across undeveloped land must use caution to prevent slips and falls which can result in twisted or sprained ankles, knees, and backs.
- Whenever possible observe the conditions from a flat surface and do not enter a steep ditch or side of a steep road bed.
- If steep terrain must be negotiated coordinate with RHSM to evaluate the need for ladders or ropes to provide stability.

9.6 Utilities (underground)

An assessment for underground utilities must be conducted where there is a potential to contact underground utilities or similar subsurface obstructions during intrusive activities. Intrusive activities include excavation, trenching, drilling, hand auger, soil sampling, or similar activities.

The assessment must be conducted before any intrusive subsurface activity and must include at least the following elements:

- A background and records assessment of known utilities or other subsurface obstructions.
- Contacting and using the designated local utility locating service.

- Conducting an independent field survey to identify, locate, and mark potential underground utilities or subsurface obstructions. *Note: This is independent of, and in addition to, any utility survey conducted by the designated local utility locating service above.*
- A visual survey of the area to validate the chosen location.

When any of these steps identifies an underground utility within 5 feet (1.5 meters) of intrusive work, then non-aggressive means must be used to physically locate the utility before a drill rig, backhoe, excavator or other aggressive method is used.

Aggressive methods are never allowed within 2 feet of an identified high-risk utility (see paragraph below).

Any deviation from these requirements must be approved by the RHSM and the PM.

9.6.1 Background and Records Assessment of Known Utilities

Identify any client- or location-specific permit and/or procedural requirements (for example, dig permit or intrusive work permit) for subsurface activities. For military installations, contact the Base Civil Engineer and obtain the appropriate form to begin the clearance process.

Obtain available utility diagrams and/or as-built drawings for the facility.

Review locations of possible subsurface utilities including sanitary and storm sewers, electrical lines, water supply lines, natural gas lines, fuel tanks and lines, communication lines, lighting protection systems, etc. Note: Use caution in relying on as-built drawings as they are rarely 100 percent accurate.

Request that a facility contact with knowledge of utility locations review and approve proposed locations of intrusive work.

9.6.2 Designated Local Utility Locating Service

Contact your designated local utility locating service (for example, Dig-Safe, Blue Stake, One Call) to identify and mark the location of utilities. Call 811 in the US or go to www.call811.com to identify the appropriate local service group. Contacting the local utility locating service is a legal requirement in most jurisdictions.

9.6.3 Independent Field Survey (Utility Locate)

The organization conducting the intrusive work (CH2M HILL or subcontractor) shall arrange for an independent field survey to identify, locate, and mark any potential subsurface utilities in the work area. This survey is in addition to any utility survey conducted by the designated local utility-locating service.

The independent field survey provider shall determine the most appropriate instrumentation/technique or combinations of instrumentation/techniques to identify subsurface utilities based on their experience and expertise, types of utilities anticipated to be present, and specific site conditions.

A CH2M HILL or subcontractor representative must be present during the independent field survey to observe the utility locate and verify that the work area and utilities have been properly identified and marked. If there is any question that the survey was not performed adequately or the individual was not qualified, then arrangements must be made to obtain a qualified utility locate service to re-survey the area. Obtain documentation of the survey and clearances in writing and signed by the party conducting the clearance. Maintain all documentation in the project file.

If the site owner (military installation or client) can provide the independent field survey, CH2M HILL or the subcontractor shall ensure that the survey includes:

- Physically walking the area to verify the work location and identify, locate, and mark underground utility locations.
- Having qualified staff available and instrumentation to conduct the locate.
- Agreeing to document the survey and clearances in writing.

- Should any of the above criteria not be met, CH2M HILL or subcontractor must arrange for an alternate independent utility locate service to perform the survey.
- The markings from utility surveys must be protected and preserved until the markings are no longer required. If the utility location markings are destroyed or removed before intrusive work commences or is completed, the PM, SC, or designee must notify the independent utility locate service or the designated local utility locating service to resurvey and remark the area.

9.6.4 Visual Assessment before and during Intrusive Activities

Perform a "360 degree" assessment. Walk the area and inspect for utility-related items such as valve caps, previous linear cuts, patchwork in pavement, hydrants, manholes, utility vaults, drains, and vent risers in and around the dig area.

The visual survey shall include all surface landmarks, including manholes, previous liner cuts, patchwork in pavement, pad-mounted transformers, utility poles with risers, storm sewer drains, utility vaults, and fire hydrants.

If any unanticipated items are found, conduct further research before initiating intrusive activities and implement any actions needed to avoid striking the utility or obstruction.

9.6.5 Subsurface Activities within 5 feet of an Underground Utility or if there is Uncertainty

When aggressive intrusive activities will be conducted within 5 feet (1.5 meters) of an underground utility or when there is uncertainty about utility locations, locations must be physically verified by non-aggressive means such as air or water knifing, hand digging, or human powered hand augering. Non-conductive tools must be used if electrical hazards may be present. If intrusive activities are within 5 feet (1.5 meters) and parallel to a marked existing utility, the utility location must be exposed and verified by non-aggressive methods every 100 feet (30.5 meters). Check to see if the utility can be isolated during intrusive work.

9.6.5.1. Intrusive Activities within 2 feet of an Underground Utility

Use non-aggressive methods (hand digging, vacuum excavation, etc.) to perform intrusive activities within 2 feet of a high-risk utility (that is, a utility that cannot be de-energized or would cause significant impacts to repair/replace). Hazardous utilities shall be de-energized whenever possible.

9.6.6 Spotter

A spotter shall be used to monitor for signs of utilities during advancement of intrusive work (for example, sudden change in advancement of auger or split spoon, presence of pea gravel or sand in soils, presence of concrete or other debris in soils, refusal of auger or excavating equipment). If any suspicious conditions are encountered, stop work immediately and contact the PM or RHSM to evaluate the situation. The spotter must have a method to alert an operator to stop the intrusive activity (for example, air horn, hand signals).

9.7 Utilities (overhead)

9.7.1 Proximity to Power Lines

It must be determined whether equipment operations including, positioning, and traveling will occur in proximity to power lines within 20 feet (6.1 meters) for line voltage up to 350 kV, and within 50 feet (15.2 meters) for line voltage between 350 kV to 1,000 kV. For power lines over 1,000 kV, the distance must be determined by the utility/operator or qualified registered professional engineer in electrical power transmission and distribution.

Operations adjacent to overhead power lines are PROHIBITED unless one of the following conditions is satisfied:

- Power has been shut off, positive means (such as lockout) have been taken to prevent the lines from being energized, lines have been tested to confirm the outage, and the utility company has provided a signed certification of the outage.
- The minimum clearance from energized overhead lines is as shown in the table below, or the equipment will be repositioned and blocked to ensure that no part, including cables, can come within the minimum clearances shown in the table.

Minimum Distances from Powerlines

Powerlines Nominal System Kv	Minimum Required Distance, Feet (Meters)
0-50	10 (3.0)
50-200	15 (4.6)
201-350	20 (6.1)
351-500	25 (7.6)
501-750	35 (10.7)
751-1000	45 (13.7)
Over 1000	Established by utility owner/operator or by a professional engineer in electrical power transmission/distribution

(These distances have been determined to eliminate the potential for arcing based on the line voltage.)

- The power line(s) has been isolated through the use of insulating blankets which have been properly placed by the utility. If insulating blankets are used, the utility will determine the minimum safe operating distance; get this determination in writing with the utility representative's signature.
- All inquiries regarding electric utilities must be made in writing and a written confirmation of the outage/isolation must be received by the PM prior to the start of work.

9.8 Vinyl Chloride

(Reference CH2M HILL, SOP HSE-512, *Vinyl Chloride*)

Vinyl chloride is considered a “Confirmed Human Carcinogen.” Vinyl chloride has a mild, sweet, chloroform-like odor.

CH2M HILL is required to control employee workplace exposure to vinyl chloride when personal exposures are at or above 1.0 ppm as an 8-hour TWA or above 5.0 ppm STEL, by implementing a program that meets the requirements of the OSHA vinyl chloride standard, 29 CFR 1910.1017. The elements of the CH2M HILL vinyl chloride program include the following:

- Exposure monitoring
- Methods of control, including personal protective equipment (PPE) and respirators
- Medical surveillance
- Training on hazards of vinyl chloride and control measures (includes project-specific training and the computer-based training on CH2M HILL’s Virtual Office, *Vinyl Chloride)*
- Record keeping requirements

If air monitoring indicates there is potential exposure at the action level concentrations above, notify the RHSM to ensure the above have been adequately addressed. Other exposure control measures include:

- Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met.

- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas.
- Respiratory protection and other exposure controls selection shall be based on the most recent exposure monitoring results obtained from the competent person.
- Review the fact sheet included as an attachment to this SSHP.

SECTION 10

Physical Hazards and Controls

Physical hazards include exposure to temperature extremes, sun, noise, and radiation. If you encounter a physical hazard that has not been identified in this plan, contact the RHSM so that a revision to this plan can be made.

10.1 Contingency Plan for Severe Weather

10.1.1 Inclement Weather

- Work may proceed in light rain—wear rain gear. However, no roof work can proceed during any storm event.
- Exposure to slips, trips, and falls is increased during rainy conditions.
- Take cover in a sheltered location during adverse weather conditions (high winds, heavy rain).
- Work shall cease and cover shall be taken in the event of lightning or tornado warnings.
- Identify "Take Shelter" areas before starting the project.
- Notify the PM and Client representative after shelter has been sought.

Adverse weather conditions requiring immediate suspension of fieldwork activities are defined as the following:

- Thunder or lightning. Thunderstorm watches or warning, as the situation warrants, will be used as an alert to potential electrical activity. Typically, a 30-minute stand-down occurs to allow the storm cell to pass the area. If lightning or thunder is observed within the stand down period, the 30-minute timeframe is extended until electrical activity ceases.
- Sustained wind gusts of 25 miles per hour for boating activities.
- Sustained wind speeds of 25 miles per hour or wind gusts of 35 miles per hour for high-profile work where wind chill is not a factor, that is, greater than 60 degrees Fahrenheit (°F).
- Sustained wind speeds of 40 miles per hour or wind gusts of 45 miles per hour for non-high-profile work.
- Moderate rain and/or snow fall of 0.11 to 0.3 inch per hour during hoisting activities. Freezing rain is also cause for suspending hoist use.
- An equivalent wind chill factor of minus 24°F on the wind chill factor chart (see Section 10.4.2) will trigger systematic shut down of all non-emergency work activities.
- A tornado or hurricane warning for the general area or county will suffice in requiring a general work stoppage.
- If you are inadvertently caught outside in a thunder/lightning storm, move away from all metal structures.

10.2 Noise

(Reference CH2M HILL SOP HSE-108, *Hearing Conservation*)

CH2M HILL is required to control employee exposure to occupational noise levels of 85 decibels (dBA), A-weighted, and above by implementing a hearing conservation program that meets the requirements of the OSHA Occupational Noise Exposure standard, 29 CFR 1910.95. A noise assessment may be conducted by the RHSM or designee based on potential to emit noise above 85 dBA and also considering the frequency and duration of the task.

- Areas or equipment emitting noise at or above 90 dBA shall be evaluated to determine feasible engineering controls. When engineering controls are not feasible, administrative controls can be developed and appropriate hearing protection will be provided.
- Areas or equipment emitting noise levels at or above 85 dBA, hearing protection must be worn.
- Employees exposed to 85 dBA or a noise dose of 50 percent must participate in the hearing conservation program including initial and annual (as required) audiograms.
- The RHSM will evaluate appropriate controls measures and work practices for employees who have experienced a standard threshold shift in their hearing.
- Employees who are exposed at or above the action level of 85 dBA are required to complete the online Noise Training Module located on CH2M HILL's Virtual Office.
- Hearing protection will be maintained in a clean and reliable condition, inspected prior to use and after any occurrence to identify any deterioration or damage, and damaged or deteriorated hearing protection repaired or discarded.
- In work areas where actual or potential high noise levels are present at any time, hearing protection must be worn by employees working or walking through the area.
- Areas where tasks requiring hearing protection are taking place may become hearing protection required areas as long as that specific task is taking place.
- High noise areas requiring hearing protection should be posted or employees must be informed of the requirements in an equivalent manner and a copy of the OSHA standard 29 CFR 1910.95 shall be posted in the workplace.

10.3 Ultraviolet Radiation (sun exposure)

Health effects regarding ultraviolet (UV) radiation are confined to the skin and eyes. Overexposure can result in many skin conditions, including erythema (redness or sunburn), photoallergy (skin rash), phototoxicity (extreme sunburn acquired during short exposures to UV radiation while on certain medications), premature skin aging, and numerous types of skin cancer. Implement the following controls to avoid sunburn.

10.3.1 Limit Exposure Time

- Rotate staff so the same personnel are not exposed all of the time.
- Limit exposure time when UV radiation is at peak levels (approximately 2 hours before and after the sun is at its highest point in the sky).
- Avoid exposure to the sun, or take extra precautions when the UV index rating is high.

10.3.2 Provide Shade

- Take lunch and breaks in shaded areas.
- Create shade or shelter through the use of umbrellas, tents, and canopies.
- Fabrics such as canvas, sailcloth, awning material and synthetic shade cloth create good UV radiation protection.
- Check the UV protection of the materials before buying them. Seek protection levels of 95 percent or greater, and check the protection levels for different colors.

10.3.3 Clothing

- Reduce UV radiation damage by wearing proper clothing; for example, long sleeved shirts with collars, and long pants. The fabric should be closely woven and should not let light through.
- Head protection should be worn to protect the face, ears, and neck. Wide-brimmed hats with a neck flap or “Foreign Legion” style caps offer added protection.
- Wear UV-protective sunglasses or safety glasses. These should fit closely to the face. Wrap-around style glasses provide the best protection.

10.3.4 Sunscreen

- Apply sunscreen generously to all exposed skin surfaces at least 20 minutes before exposure, allowing time for it to adhere to the skin.
- Re-apply sunscreen at least every 2 hours, and more frequently when sweating or performing activities where sunscreen may be wiped off.
- Choose a sunscreen with a high sun protection factor. Most dermatologists advocate sun protection factor 30 or higher for significant sun exposure.
- Waterproof sunscreens should be selected for use in or near water, and by those who perspire sufficiently to wash off non-waterproof products.
- Check for expiration dates, because most sunscreens are only good for about 3 years. Store in a cool place out of the sun.
- No sunscreen provides 100 percent protection against UV radiation. Other precautions must be taken to avoid overexposure.

10.4 Temperature Extremes

(Reference CH2M HILL SOP HSE-211, *Heat and Cold Stress*)

Each employee is responsible for the following:

- Recognizing the symptoms of heat or cold stress.
- Taking appropriate precautionary measures to minimize their risk of exposure to temperature extremes (see following sections).
- Communicating any concerns regarding heat and cold stress to their supervisor or SC.

10.4.1 Heat

Heat-related illnesses are caused by more than just temperature and humidity factors.

Physical fitness influences a person’s ability to perform work under heat loads. At a given level of work, the more fit a person is, the less the physiological strain, the lower the heart rate, the lower the body temperature (indicates less retrained body heat—a rise in internal temperature precipitates heat injury), and the more efficient the sweating mechanism.

Acclimatization is a gradual physiological adaptation that improves an individual’s ability to tolerate heat stress. Acclimatization requires physical activity under heat-stress conditions similar to those anticipated for the work. With a recent history of heat-stress exposures of at least 2 continuous hours per day for 5 of the last 7 days to 10 of the last 14 days, a worker can be considered acclimatized. Its loss begins when the activity under those heat-stress conditions is discontinued, and a noticeable loss occurs after 4 days and may be completely lost in 3 to 4 weeks. Because acclimatization is to the level of the heat-stress exposure, a person will not be fully acclimatized to a sudden higher level, such as during a heat wave.

Dehydration reduces body water volume. This reduces the body's sweating capacity and directly affects its ability to dissipate excess heat.

The ability of a body to dissipate heat depends on the ratio of its surface area to its mass (surface area/weight). **Heat dissipation** is a function of surface area, while heat production depends on body mass. Therefore, overweight individuals (those with a low ratio) are more susceptible to heat-related illnesses because they produce more heat per unit of surface area than if they were thinner. Monitor these persons carefully if heat stress is likely.

When wearing **impermeable clothing**, the weight of an individual is not as important in determining the ability to dissipate excess heat because the primary heat dissipation mechanism, evaporation of sweat, is ineffective.

Symptoms and Treatment Of Heat Stress

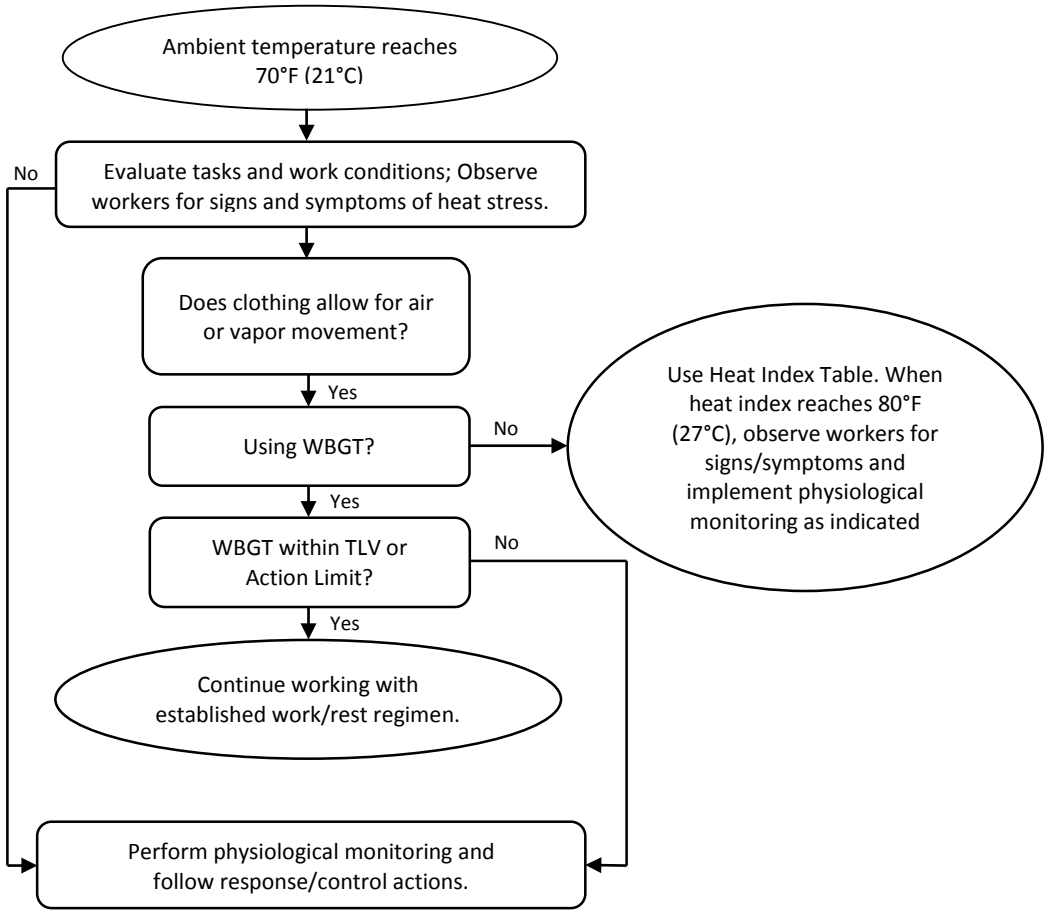
	Heat Syncope	Heat Rash	Heat Cramps	Heat Exhaustion	Heat Stroke
Signs and Symptoms	Sluggishness or fainting while standing erect or immobile in heat.	Profuse tiny raised red blister-like vesicles on affected areas, along with prickling sensations during heat exposure.	Painful spasms in muscles used during work (arms, legs, or abdomen); onset during or after work hours.	Fatigue, nausea, headache, giddiness; skin clammy and moist; complexion pale, muddy, or flushed; may faint on standing; rapid thready pulse and low blood pressure; oral temperature normal or low.	Red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; high oral temperature of 104°F or higher.
Treatment	Remove to cooler area. Rest lying down. Increase fluid intake. Recovery usually is prompt and complete.	Use mild drying lotions and powders, and keep skin clean for drying skin and preventing infection.	Remove to cooler area. Rest lying down. Increase fluid intake.	Remove to cooler area. Rest lying down, with head in low position. Administer fluids by mouth. Seek medical attention.	Cool rapidly by soaking in cool—but not cold—water. Call ambulance, and get medical attention immediately!

10.4.2 Precautions

- Drink 16 ounces of water before beginning work. Disposable cups and water maintained at 50°F (10 degrees Celsius[°C]) to 60°F) (15.6°C) should be available. Under severe conditions, drink 1 to 2 cups every 20 minutes, for a total of 1 to 2 gallons (7.5 liters) per day. Remind employees to drink water throughout their work shift.
- Do not use alcohol in place of water or other nonalcoholic fluids. Decrease your intake of coffee and caffeinated soft drinks during working hours.
- Acclimate to site work conditions by slowly increasing workloads; for example, do not begin site work with extremely demanding activities. Closely monitor employees during their first 14 days of work in the field.
- Supervisors and SCs must continually observe employees throughout the work shift for signs and symptoms of heat stress or illness. Employees must monitor themselves for heat stress as well as observe their coworkers.
- Effective communication must be maintained with employees throughout the work shift either by voice, observation, or electronic device.
- Use cooling devices, such as cooling vests, to aid natural body ventilation. These devices add weight, so their use should be balanced against efficiency.

- Use mobile showers or hose-down facilities to reduce body temperature and cool protective clothing.
- Conduct field activities in the early morning or evening and rotate shifts of workers, if possible.
- Avoid direct sun whenever possible, which can decrease physical efficiency and increase the probability of heat stress. Take regular breaks in a cool, shaded area. Use a wide-brim hat or an umbrella when working under direct sun for extended periods.
- Provide adequate shade to protect personnel against radiant heat (sun, flames, hot metal).
- Use portable fans for convection cooling or in extreme heat conditions, an air-conditioned rest area when needed.
- In hot weather, rotate shifts of workers.
- Maintain good hygiene standards by frequent changes of clothing and showering. Clothing should be permitted to dry during rest periods. Persons who notice skin problems should consult medical personnel.
- Brief employees initially before the project work begins and routinely as part of the daily safety briefing, on the signs and symptoms, of heat-relatedness illnesses, precautions to measures and emergency procedures to follow as described in this plan.
- Observe one another for signs of heat stress. PREVENTION and communication are key.

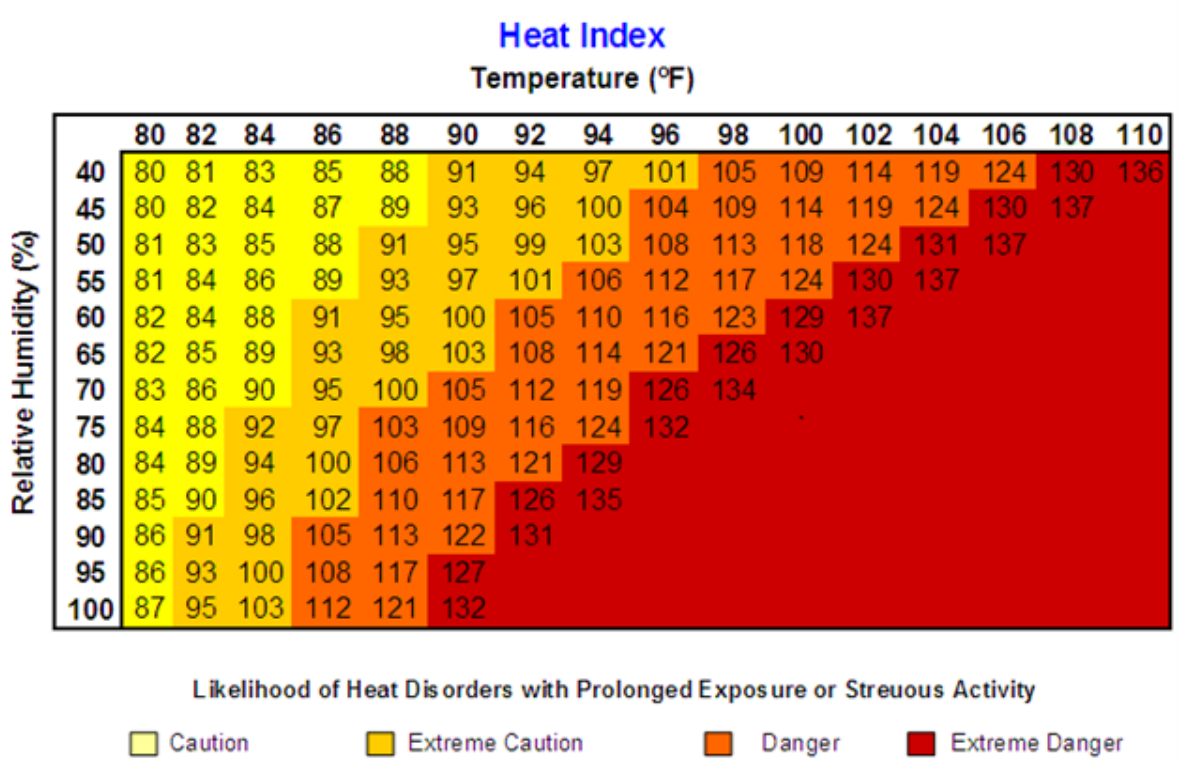
10.4.3 Thermal Stress Monitoring Flow Chart



10.4.4 Thermal Stress Monitoring—Permeable or Impermeable Clothing

When **permeable work clothes** are worn (street clothes or clothing ensembles over street clothes), regularly observe workers for signs and symptoms of heat stress and implement physiological monitoring as indicated below. This should start when the heat index reaches 80°F (27°C) [see Heat Index Table below], or sooner if workers exhibit symptoms of heat stress indicated in the table above. The heat index values were devised for shady, light wind conditions; exposure to full sunshine can increase the values by up to 15°F (8°C). Also, strong winds, particularly with very hot, dry air, can be extremely hazardous.

When wearing **impermeable clothing** (for example, clothing doesn't allow for air or water vapor movement such as Tyvek), physiological monitoring as described below shall be conducted when the ambient temperature reaches 70°F (21°C) or sooner when climatic conditions may present greater risk of heat stress combined with wearing unique variations of impermeable clothing, or workers exhibit symptoms of heat stress.



Heat Index	Possible Heat Disorders	Minimum Frequency of Physiological Monitoring
80°F - 90°F (27°C - 32°C)	Fatigue possible with prolonged exposure and/or physical activity	Conduct initial monitoring as baseline and observe workers for signs of heat stress and implement physiological monitoring if warranted.
90°F - 105°F (32°C - 41°C)	Sunstroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity	Conduct initial monitoring as baseline, then at least every hour, or sooner, if signs of heat stress are observed.
105°F - 130°F (41°C - 54°C)	Sunstroke, heat cramps, or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity.	Conduct initial monitoring as baseline, then every 30 minutes or sooner if signs of heat stress are observed.
130°F or Higher (54°C or Higher)	Heat/Sunstroke highly likely with continued exposure.	Conduct initial monitoring as baseline, then every 15 minutes or sooner if signs of heat stress are observed.

Source: National Weather Service

10.4.4.1. Physiological Monitoring and Associated Actions

For employees wearing permeable clothing, follow the minimum frequency of physiological monitoring listed in the Heat Index Table.

For employees wearing impermeable clothing, physiological monitoring should begin initially at a 15-minute interval, then if the employee's heart rate or body temperature is within acceptable limits, conduct the subsequent physiological monitoring at 30 minutes, and follow the established regimen protocol below.

When physiological monitoring is required, use either radial pulse or aural temperature and follow actions below:

- The sustained heart rate during the work cycle should remain below 180 beats per minute (bpm) minus the individual's age (for example 180 – 35 year old person = 145 bpm). The sustained heart rate can be estimated by measuring the heart rate at the radial pulse for 30 seconds as quickly as possible prior to starting the rest period.
- The heart rate after one minute rest period should not exceed 120 bpm.
- If the heart rate is higher than 120 bpm after the FIRST minute into the rest period, the next work period should be shortened by 33 percent, while the length of the rest period stays the same.
- If the pulse rate still exceeds 120 bpm at the beginning of the next rest period, the following work cycle should be further shortened by 33 percent.
- Continue this procedure until the rate is maintained below 120 bpm after the FIRST minute into the rest period.

Alternately, the body temperature can be measured, either oral or aural (ear), before the workers have something to drink.

- If the oral or aural temperature exceeds 99.6°F (37.6°C) at the beginning of the rest period, the following work cycle should be shortened by 33 percent.
- Continue this procedure until the oral or aural (ear) temperature is maintained below 99.6°F (37.6°C). While an accurate indication of heat stress, oral temperature is difficult to measure in the field; however, a digital aural (aural) thermometer is easy to obtain and inexpensive to purchase.
- Use the form attached to this HSP to track workers' measurements and actions taken.

10.4.4.2. Procedures for when Heat Illness Symptoms are Experienced

- **Always** contact the RHSM when any heat illness related symptom is experienced so that controls can be evaluated and modified, if needed.
- In the case of cramps, reduce activity, increase fluid intake, move to shade until recovered.
- In the case of all other heat-related symptoms (fainting, heat rash, heat exhaustion), and if the worker is a CH2M HILL worker, contact the occupational physician at 1-866-893-2514 and immediate supervisor.
- In the case of heat stroke symptoms, call 911, have a designee give location and directions to ambulance service if needed, follow precautions under the emergency medical treatment of this HSP.
- Follow the Incident Notification, Reporting, and Investigation section of this HSP.

10.4.5 Cold

10.4.5.1. General

Low ambient temperatures increase the heat lost from the body to the environment by radiation and convection. In cases where the worker is standing on frozen ground, the heat loss is also due to conduction.

Wet skin and clothing, whether because of water or perspiration, may conduct heat away from the body through evaporative heat loss and conduction. Thus, the body cools suddenly when chemical protective clothing is removed if the clothing underneath is perspiration-soaked.

Movement of air across the skin reduces the insulating layer of still air just at the skin's surface. Reducing the insulating layer of air increases heat loss by convection.

Non-insulating materials in contact or near-contact with the skin, such as boots constructed with a metal toe or shank, conduct heat rapidly away from the body.

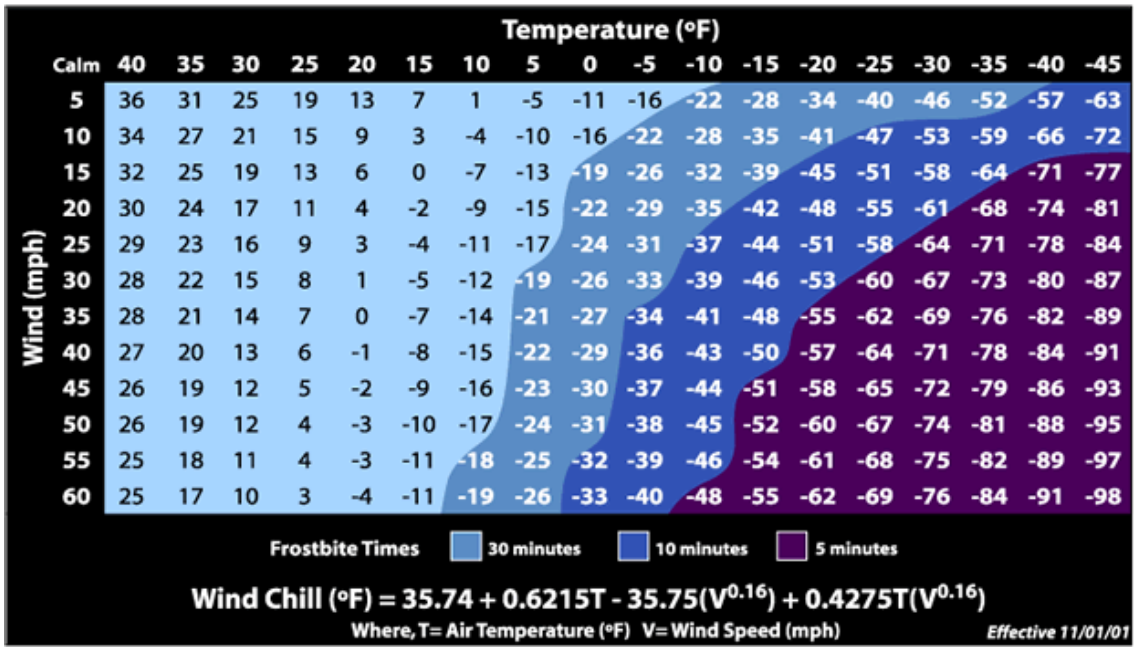
Certain common drugs, such as alcohol, caffeine, or nicotine, may exacerbate the effects of cold, especially on the extremities. The chemicals reduce the blood flow to peripheral parts of the body, which are already high-risk areas because of their large surface area to volume ratios. These substances may also aggravate an already hypothermic condition.

10.4.5.2. Precautions

- Be aware of the symptoms of cold-related disorders, and wear proper, layered clothing for the anticipated fieldwork. Appropriate rain gear is a must in wet weather.
- Consider monitoring the work conditions and adjusting the work schedule using guidelines developed by the U.S. Army (wind-chill index) and the National Safety Council.
- Wind-Chill Index (below) is used to estimate the combined effect of wind and low air temperatures on exposed skin. The wind-chill index does not take into account the body part that is exposed, the level of activity, or the amount or type of clothing worn. For those reasons, it should only be used as a guideline to warn workers when they are in a situation that can cause cold-related illnesses.
- Persons who experience initial signs of immersion foot, frostbite, and/or hypothermia should report it immediately to their supervisor/PM to avoid progression of cold-related illness.
- Observe one another for initial signs of cold-related disorders.
- Obtain and review weather forecast – be aware of predicted weather systems along with sudden drops in temperature, increase in winds, and precipitation.

Symptoms and Treatment Of Cold Stress

	Immersion (Trench) Foot	Frostbite	Hypothermia
Signs and Symptoms	Feet discolored and painful; infection and swelling present.	Blanched, white, waxy skin, but tissue resilient; tissue cold and pale.	Shivering, apathy, sleepiness; rapid drop in body temperature; glassy stare; slow pulse; slow respiration.
Treatment	Seek medical treatment immediately.	Remove victim to a warm place. Re-warm area quickly in warm—but not hot—water. Have victim drink warm fluids, but not coffee or alcohol. Do not break blisters. Elevate the injured area, and get medical attention.	Remove victim to a warm place. Have victim drink warm fluids, but not coffee or alcohol. Get medical attention.



10.5 Radiological Hazards

Refer to CH2M HILL's Core Standard, Radiological Control and Radiological Controls Manual for additional requirements.

Hazards	Controls
None Known	None Required

SECTION 11

Biological Hazards and Controls

Biological hazards are everywhere and change with the region and season. During project planning stages, ask the site Point of Contact if there are insect or other biological hazards that have been noted at any of the work sites.

If you encounter a biological hazard that has not been identified in this plan, contact the RHSM so that a revision to this plan can be made. Whether it is contact with a poisonous plant, a poisonous snake, or a bug bite, do not take bites or stings lightly. If there is a chance of an allergic reaction or infection, or to seek medical advice on how to properly care for the injury, contact the occupational nurse at 1-866-893-2514.

11.1 Bees and Other Stinging Insects

Bees and other stinging insects may be encountered almost anywhere and may present a serious hazard, particularly to people who are allergic.

Precautions include the following:

- Watch for and avoid nests.
- Keep exposed skin to a minimum.
- Carry a kit if you have had allergic reactions in the past, and inform your supervisor and/or a buddy. When working at a remote location, ensure that first-aid kits contain over-the-counter allergy and itch medication (for example, Benadryl, Claritin, etc.) as well as other over-the-counter medications that may not be available to aid in symptom treatment.
- If bees or other stinging insects are known to be present, determine whether additional protective clothing should be donned before entering/working in brushy areas.
- Before entering a heavily vegetated or brushy area, observe the area for several minutes to see if bees or other stinging insects may be present. If nests or individual insects are observed, retreat and inquire whether a specialist or a client service can be contacted to clear the area before work proceeds.
- Consider if heavy-weight clothing or Tyvek, or head netting would provide additional protection in areas where wasps/bees are known or suspected. Be aware of heat stress conditions that additional clothing may cause.
- Use insect repellent on clothing. Wear light-colored clothing and remove bright reflective safety-colored clothing if not working near a roadway as these may attract the wasps.
- Wear fragrance-free or lightly-scented sunscreen, and body lotions. Bees are attracted to sweet scents. Avoid using floral scented soaps, shampoos, or conditioners.
- Move slowly and calmly through vegetated areas and try to avoid major disturbance of vegetation as wasps/bees often react to aggressive movement.
- If you encounter a wasp, back away slowly and calmly, do not run or swat at the insect. Wait for it to leave, or gently move or brush it off gently with a piece of paper or other light object. Do not use your hand.

If you are stung, contact the occupational nurse at 1-866-893-2514, no matter how minor it may seem. If a stinger is present, remove it as soon as possible using something with a thin, hard edge (for example, credit card) to scrape the stinger out. Be sure to sanitize the object first with hand sanitizer, alcohol, or soap and water. Wash and disinfect the wound, cover it, and apply ice. Watch for an allergic reaction if you have never been stung before. Call 911 if the reaction is severe.

11.2 Coyotes

While far from domesticated, coyotes show little fear of humans and have become comfortable living in close proximity to our communities. Although they tend to do most of their hunting after dusk, coyotes can be active at any time. Under normal circumstances, a coyote is not a danger to humans. They are, however, territorial and will respond aggressively if they or their family are threatened.

If you encounter a coyote that behaves aggressively, you have probably gotten too close to its prey or its family. Try to scare the coyote by yelling and waving your arms. Throw rocks, sticks, or other objects. Do not turn away and run.

11.3 Feral Dogs

Avoid all dogs, both leashed and stray. Do not disturb a dog while it is sleeping, eating, or caring for puppies. If a dog approaches to sniff you, stay still. An aggressive dog has a tight mouth, flattened ears, and a direct stare. If you are threatened by a dog, remain calm, do not scream, and avoid eye contact. If you say anything, speak calmly and firmly. Do not turn and run, try to stay still until the dog leaves, or back away slowly until the dog is out of sight or you have reached safety (for example vehicle). If attacked, retreat to vehicle or attempt to place something between you and the dog. If you fall or are knocked to the ground, curl into a ball with your hands over your head and neck and protect your face. If bitten, contact the occupational nurse at 1-866-893-2514. Report the incident to the local authorities.

11.4 Fire Ants

There are several types of fire ants in the United States that can cause painful bites and allergic reactions. Fire ants aggressively defend their nests by stinging several times after climbing on their victims. Large ant mounds are easily visible, but there can be smaller mounds or nests with little “worked” soil that can be stepped on inadvertently. They can also be under rocks, wood, or other debris. Implement the following when fire ants are observed:

- Be aware of fire ants and take care not to stand on ant nests.
- Use insect repellents on clothing and footwear to temporarily discourage ants from climbing.
- Tuck pants into socks.

If stung, get away from the area on which you are standing, briskly brush off ants, and wash the affected area with soap. Call the occupational nurse.

11.5 Giant Hogweed

Giant hogweed is a noxious weed that has become established in New York, Pennsylvania, Ohio, Maryland, Oregon, Washington, Michigan, Virginia, Vermont, New Hampshire, Maine, and adjacent areas of Canada, but can be spread to surrounding areas.

Its sap, in combination with moisture and sunlight, can cause phytophotodermatitis—a serious skin inflammation and severe eye irritation leading to blindness. Contact between the skin and the sap of this plant occurs either through brushing against the bristles on the stem or breaking the stem or leaves. Eye exposure to the sap can occur during the breaking of the stems (during clearing/grubbing). Heat, sunlight, and moisture worsen the skin reaction.

Giant hogweed is a biennial or perennial that can grow up to 12 feet (approximately 3.5 meters) or more. Its hollow, ridged stems grow 2 to 4 inches (5 to 10 centimeters) in diameter and have dark reddish-purple blotches. Its large compound leaves can grow up to 5 feet (1.5 meters) wide. Its white flower heads can grow up to 2.5 feet (approximately 1 meter) in diameter.

Symptoms of exposure include initial itching and redness, then painful blisters form within 48 hours with the area becoming dark and pigmented. Long-term effects include scarring, sensitivity of the affected area to sunlight, and temporary or permanent blindness if it gets into the eyes.

As with all hazardous plants, recognition and avoidance is key. Do not touch any portion of the plant. Become familiar with the identity of the plants (see below). Wear protective clothing that covers exposed skin and clothes. Avoid contact with plants and the outside of protective clothing. If skin contacts a plant, wash the area with soap and cold water immediately. Keep exposed area away from sunlight for 48 hours. Contact the occupational nurse immediately.

11.6 Hantavirus

Hantavirus pulmonary syndrome is a disease caused by a virus that can be transmitted from certain rodents to humans and is prevalent throughout the United States. Avoid disturbing rodent nests. Contact is most likely to occur when there is a current rodent infestation in things like control boxes, storage sheds, wellheads, remediation equipment, or trailers. Once excreted into the environment by the rodent, hantaviruses can survive in the environment and remain infectious for a period of 2 to 3 days. Ultraviolet rays in sunlight inactivate hantaviruses.

Nesting material and droppings must be removed if work is necessary in a rodent-infested area. PPE for removal shall include the following:

- Tyvek coveralls
- Rubber boots or disposable shoe covers
- Rubber, latex, or vinyl gloves
- Respiratory protection such as a full-face or half-mask air-purifying respirator with a high-efficiency particulate arresting (HEPA) filter
- Protective goggles if wearing a half-mask respirator

Spray any urine, droppings, and nesting materials with either a bleach and water solution (1 part bleach to 9 parts water) or a household disinfectant prepared according to the label instructions for dilution and disinfection time. Soak well and let stand for 15 minutes. Use a paper towel or rag to pick up the materials and dispose of them.

Mop floors after spraying them using bleach and water solution or a disinfectant. Dirt floors can be sprayed with either bleach and water solution or a disinfectant.

Personal protective gear shall be decontaminated upon removal at the end of the day. All potentially infective waste material (including respirator filters) from cleanup operations shall be double-bagged in plastic bags.

11.6.1 Symptoms of Hantavirus

Symptoms develop between 14 and 31 days after exposure to infected rodents and include fatigue, fever, and muscle aches, especially the large muscle groups—thighs, hips, back, and sometimes shoulders. About half of all Hantavirus patients also experience headaches, dizziness, chills, and/or abdominal pain. Four to 10 days after the initial phase of the illness, late symptoms of Hantavirus may appear, including coughing and shortness of breath. If you develop symptoms suggestive of Hantavirus, call the occupational nurse at 1-866-893-2514.

11.7 Mosquito Bites

Due to the recent detection of the West Nile Virus in the southwestern United States, it is recommended that preventative measures be taken to reduce the probability of being bitten by mosquitoes whenever possible. Mosquitoes are believed to be the primary source for exposure to the West Nile Virus as well as several other types of encephalitis. The following guidelines should be followed to reduce the risk of these concerns for working in areas where mosquitoes are prevalent:

- Stay indoors at dawn, dusk, and in the early evening.
- Wear long-sleeved shirts and long pants whenever you are outdoors
- Spray clothing with repellents containing permethrin or N,N-diethyl-meta-toluamide (DEET) since mosquitoes may bite through thin clothing.
- Apply insect repellent sparingly to exposed skin. An effective repellent will contain 35 percent DEET. Repellents may irritate the eyes and mouth, so avoid applying repellent to the hands.
- Whenever you use an insecticide or insect repellent, be sure to read and follow the manufacturer's DIRECTIONS FOR USE, as printed on the product.

Vitamin B and "ultrasonic" devices are NOT effective in preventing mosquito bites.

11.7.1 Symptoms of Exposure to the West Nile Virus

Most infections are mild, and symptoms include fever, headache, and body aches, occasionally with skin rash and swollen lymph glands. More severe infection may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and, rarely, death.

The West Nile Virus incubation period is from 3 to 15 days.

Contact the project RHSM with questions, and immediately report any suspicious symptoms to your supervisor and PM, and contact the occupational nurse at 1-866-893-2514.

11.8 Poison Ivy, Poison Oak, and Poison Sumac

Poison ivy, poison oak, and poison sumac typically are found in brush or wooded areas. They are more commonly found in moist areas or along the edges of wooded areas. Shrubs are usually 12 to 30 inches high, or can also be a tree-climbing vine, with triple leaflets and short, smooth hair underneath. Plants are red and dark green in spring and summer, with yellowing leaves anytime especially in dry areas. Leaves may achieve bright reds in fall, but plants lose its (yellowed, then brown) leaves in winter, leaving toxic stems. All parts of the plant remain toxic throughout the seasons. These plants contain urushiol a colorless or pale yellow oil

that oozes from any cut or crushed part of the plant, including the roots, stems and leaves and causes allergic skin reactions when contacted. The oil is active year round.

Become familiar with the identity of the plants (see images below). Wear protective clothing that covers exposed skin and clothes. Avoid contact with plants and the outside of protective clothing. If skin contacts a plant, wash the area with soap and water immediately. If the reaction is severe or worsens, seek medical attention.

Poison Ivy

Poison Sumac

Poison Oak

Contamination with poison ivy, sumac, or oak can happen through several pathways, including the following:

- Direct skin contact with any part of the plant (even roots once aboveground foliage has been removed).
- Contact with clothing that has been contaminated with the oil.
- Contact from removing shoes that have been contaminated (shoes are coated with urushiol oil).
- Sitting in a vehicle that has become contaminated.
- Contact with any objects or tools that have become contaminated.
- Inhalation of particles generated by weed-whacking, chipping, and vegetation clearing.

If you must work on a site with poison ivy, sumac, or oak, the following precautions are necessary:

- Do not drive vehicles onto the site where it will come into contact with poison ivy, sumac, or oak. Vehicles that need to work in the area, such as drill rigs or heavy equipment must be washed as soon as possible after leaving the site.
- All tools used in the poison ivy, sumac, or oak area, including those used to cut back poison oak, surveying instruments used in the area, air monitoring equipment, or other test apparatus must be decontaminated before they are placed back into the site vehicle. If onsite decontamination is not possible, use plastic to wrap any tools or equipment until they can be decontaminated.
- PPE, including Tyvek coveralls, gloves, and boot covers must be worn. PPE must be placed into plastic bags and sealed if they are not disposed of immediately into a trash receptacle.
- As soon as possible following the work, shower to remove any potential contamination. Any body part with suspected or actual exposure should be washed with Zanfel, Tecnu, or other product designed for removing urushiol. If you do not have Zanfel or Tecnu, wash with cold water. Do not take a bath because the oils can form an invisible film on top of the water and contaminate your entire body upon exiting the bath.
- Tecnu may also be used to decontaminate equipment.
- Use IvyBlock or similar products to prevent poison oak, ivy, and sumac contamination. Check with the closest CH2M HILL warehouse to see if these products are available. Follow all directions for application.

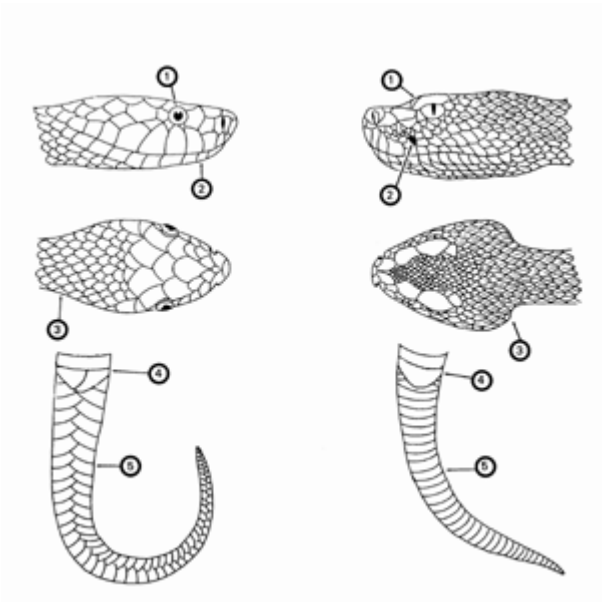
If you do come into contact with one of these poisonous plants and a reaction develops, contact your supervisor and the occupational nurse 1-866-893-2514.

11.9 Snakes

Snakes typically are found in underbrush and tall grassy areas. If you encounter a snake, stay calm and look around; there may be other snakes. Turn around and walk away on the same path you used to approach the area. If bitten by a snake, wash and immobilize the injured area, keeping it lower than the heart if possible. Call the occupational nurse at 1-866-893-2514 immediately. Do not apply ice, cut the wound, or apply a tourniquet. Try to identify the type of snake: note color, size, patterns, and markings. The following is a guide to identifying poisonous snakes from non-poisonous snakes.

Identification of Poisonous Snakes

Major Identification Features Non-venomous Snake	Major Identification Features Venomous Snake
1. Round pupils 2. No sensing pit 3. Head slightly wider than neck 4. Divided anal plate 5. Double row of scales on the underside of the tail	1. Elliptical pupils 2. Sensing pit between eye and nostril 3. Head much wider than neck 4. Single anal plate 5. Single scales on the underside of the tail



11.10 Spiders—Brown Recluse and Widow

The Brown Recluse spider can be found most anywhere in the United States. It varies in size in shape, but the distinguishing mark is the violin shape on its body. They are typically non-aggressive. Keep an eye out for irregular, pattern-less webs that sometimes appear almost tubular built in a protected area such as in a crevice or between two rocks. The spider will retreat to this area of the web when threatened.

The Black Widow, Red Widow, and the Brown Widow are all poisonous. Most have globose, shiny abdomens that are predominantly black with red markings (although some may be pale or have lateral stripes), with moderately long, slender legs. The spiders are nocturnal and build a three-dimensional tangled web, often with a conical tent of dense silk in a corner where the spider hides during the day.

11.10.1 Hazard Controls

- Inspect or shake out any clothing, shoes, towels, or equipment before use.
- Wear protective clothing such as a long-sleeved shirt and long pants, hat, gloves, and boots when handling stacked or undisturbed piles of materials.
- Minimize the empty spaces between stacked materials.
- Remove and reduce debris and rubble from around the outdoor work areas.
- Trim or eliminate tall grasses from around outdoor work areas.
- Store apparel and outdoor equipment in tightly closed plastic bags.
- Keep your tetanus boosters up-to-date (every 10 years). Spider bites can become infected with tetanus spores.

If you think you have been bit by a poisonous spider, immediately call the occupational nurse at 1-866-893-2514 and follow the guidance below:

- Remain calm. Too much excitement or movement will increase the flow of venom into the blood.
- Apply a cool, wet cloth to the bite or cover the bite with a cloth and apply an ice bag to the bite.
- Elevate the bitten area, if possible.
- Do not apply a tourniquet, and do not try to remove venom.
- Try to positively identify the spider to confirm its type. If the spider has been killed, collect it in a plastic bag or jar for identification purposes. Do not try to capture a live spider—especially if you think it is a poisonous spider.

Black Widow

Red Widow

Brown Widow

Brown Recluse

11.11 Ticks

Every year employees are exposed to tick bites at work and at home putting them at risk of illness. Ticks typically are in wooded areas, bushes, tall grass, and brush. Ticks are black, black and red, or brown and can be up to 0.25 inch (6.4 millimeters) in size.

In some geographic areas, exposure is not easily avoided. Wear tightly woven light-colored clothing with long sleeves and pant legs tucked into boots; spray only outside of clothing with permethrin or permanone and spray skin with DEET only. Check yourself frequently for ticks.

Where site conditions (vegetation above knee height, tick-endemic area) or when tasks (having to sit or kneel in vegetation) diminish the effectiveness of the controls mentioned above, bug-out suits (check with your local or regional warehouse) or Tyvek shall be used. Bug-out suits are more breathable than Tyvek.

Take precautions to avoid exposure by including pre-planning measures for biological hazards prior to starting fieldwork. Avoid habitats where possible and reduce the abundance through habitat disruption or application of acracide. If the controls aren't feasible, contact your local or regional warehouse for preventative equipment such as repellants, protective clothing, and tick-removal kits. Use the buddy system and perform tick inspections prior to entering the field vehicle. If ticks were not planned to be encountered and are observed, do not continue fieldwork until the controls can be implemented.

See tick fact sheet attached to this SSHP for further precautions and controls to implement when ticks are present. If bitten by a tick, follow the removal procedures found in the tick fact sheet, and call the occupational nurse at 1-866-893-2514.

Be aware of the symptoms of Lyme disease or Rocky Mountain spotted fever (RMSF). Lyme disease is a rash that might appear. The rash looks like a bull's eye with a small welt in the center. RMSF is a rash of red spots under the skin 3 to 10 days after the tick bite. In both RMSF and Lyme disease, chills, fever, headache, fatigue, stiff neck, and bone pain may develop. If symptoms appear, again contact the occupational nurse at 1-866-893-2514.

Be sure to complete an Incident Report (either use the Hours and Incident Tracking System [HITS] system on the Virtual Office) if you do come in contact with a tick.

SECTION 12

Contaminants of Concern

Table 12-1 summarizes the potential COCs and their occupational exposure limit and signs and symptoms of exposure. The table also includes the maximum concentration of each COC and the associated location and media that was sampled (groundwater, soil boring, surface soil). The concentrations were used to determine engineering and administrative controls described in the "Project-Specific Hazard Controls" section of this SSHP, as well as PPE and site monitoring requirements.

The data inserted in the table was gathered from the October-28-14 Indian Head Site 17 Performance Monitoring Health and Safety Plan.

TABLE 12-1
Contaminants of Concern

Contaminant	Location and Maximum[a] Concentration (ppm)	Exposure Limit[b]	IDLH[c]	Symptoms and Effects of Exposure	PIP[d] (eV)
Trichloroethylene (TCE)	GW: 180 ppm	10 ppm	1,000 Ca	Headache, vertigo, visual disturbance, eye and skin irritation, fatigue, giddiness, tremors, sleepiness, nausea, vomiting, dermatitis, cardiac arrhythmia, paresthesia, liver injury	9.45
cis-1,2-Dichloroethylene	GW: 52 ppm	200 ppm	1000 ppm	Irritation eyes, respiratory system; central nervous system depression	9.65
Vinyl Chloride	GW: 3 ppm	1 ppm	NL Ca	Weakness, abdominal pain, gastrointestinal bleeding, enlarged liver, pallor or cyanosis of extremities	9.99

Footnotes:

[a] Specify sample-designation and media: SB (Soil Boring), A (Air), D (Drums), GW (Groundwater), L (Lagoon), TK (Tank), SS (Surface Soil), SL (Sludge), SW (Surface Water).

[b] Appropriate value of permissible exposure limit (PEL), recommended exposure limit (REL), or threshold limit value (TLV) listed.

[c] IDLH = immediately dangerous to life and health (units are the same as specified "Exposure Limit" units for that contaminant); NL = No limit found in reference materials; CA = Potential occupational carcinogen.

[d] PIP = photoionization potential; NA = Not applicable; UK = Unknown.

eV = electron volt

mg/m3 = milligrams per cubic meter

µg/m3 = micrograms per cubic meter

SB = soil boring

Potential Routes of Exposure		
Dermal: Contact with contaminated media. This route of exposure is minimized through use of engineering controls, administrative controls and proper use of PPE.	Inhalation: Vapors and contaminated particulates. This route of exposure is minimized through use of engineering controls, administrative controls and proper use of respiratory protection when other forms of control do not reduce the potential for exposure.	Other: Inadvertent ingestion of contaminated media. This route should not present a concern if good hygiene practices are followed (for example, wash hands and face before drinking or smoking).

SECTION 13

Site Monitoring

(Reference CH2M HILL SOP HSE-207, *Exposure Monitoring for Airborne Chemical Hazards*)

When performing site monitoring, record all the information (for example, in a field logbook). Note date and time, describe monitoring location (for example, in breathing zone, at source), site location, and what the reading is. If any action levels are reached, note it in the field logbook, and note the action taken.

Exposure records (air sampling) must be preserved for the duration of employment, plus 30 years. Ensure that copies of the field logbook are maintained in the project file.

Copies of all project exposure records (for example, copies of field logbook pages where air monitoring readings are recorded and associated calibration) shall be sent to the regional safety program assistant for retention and maintained in the project files.

13.1 Direct Reading Monitoring Specifications

Instrument	Tasks	Action Levels[a]	Action to be Taken when Action Level reached	Frequency [b]	Calibration
Photoionization detector (PID): MiniRAE PID with 10.6 eV lamp or equivalent	All intrusive avoidance checks	0-5 ppm >5 ppm	Level D (no detect on VC tube) Level C – stop and notify HSM	All intrusive avoidance checks	Daily
Detector Tubes: Vinyl Chloride draeger tube or equivalent	All intrusive avoidance checks	<0.5 ppm >0.55 ppm	Level D Level C – stop and notify HSM	When PID reading continuously >/= 0.5 ppm in breathing zone	Not applicable
Noise-Level Monitor [d]	Drilling activities and screen operations	<85 dB(A) 85-120 dB(A) >120 dB(A)	No action required Hearing protection required Stop; re-evaluate	Initially and periodically during task	Daily

Notes:

[a] Action levels apply to sustained breathing-zone measurements above background.

[b] The exact frequency of monitoring depends on field conditions and is to be determined by the SC; generally, every 5 to 15 minutes if acceptable; more frequently may be appropriate.

[c] If the measured percent of O_2 is less than 10, an accurate LEL reading will not be obtained. Percent LEL and percent O_2 action levels apply only to ambient working atmospheres, and not to confined-space entry. More-stringent percent LEL and O_2 action levels are required for confined-space entry.

[d] Noise monitoring and audiometric testing also required.

VOC = volatile organic compound

13.2 Calibration Specifications

(Refer to the respective manufacturer's instructions for proper instrument-maintenance procedures)

Instrument	Gas	Span	Reading	Method
PID: MiniRAE, 10.6 eV bulb	100 ppm isobutylene	CF = 100	100 ppm	0.5 lpm reg T-tubing

Instrument	Gas	Span	Reading	Method
Dust Monitor: DataRAM	Dust-free air	Not applicable	0.00 mg/m^3 in "Measure" mode	Dust-free area OR Z-bag with HEPA filter
Sound Level Meter	Refer to Instrument Manual onsite,			

Calibrate air monitoring equipment daily (or prior to use) in accordance with the instrument's instructions. Document the calibration in the field logbook (or equivalent) and include the following information:

- Instrument name
- Serial Number
- Owner of instrument (for example, CH2M HILL, HAZCO)
- Calibration gas (including type and lot number)
- Type of regulator (for example, 1.5 lpm)
- Type of tubing (for example, direct or T-tubing)
- Ambient weather condition (for example, temperature and wind direction)
- Calibration/instrument readings
- Operator's name and signature
- Date and time

SECTION 14

Personal Protective Equipment

(Reference EM 385-1-1 Section 5, *Personal Protective and Safety Equipment*; CH2M HILL- SOP HSE-117, *Personal Protective Equipment*)

14.1 Required Personal Protective Equipment

PPE must be worn by employees when actual or potential hazards exist and engineering controls or administrative practices cannot adequately control the hazards.

A PPE assessment has been conducted by the RHSM based on project tasks (see PPE specifications below). Verification and certification of assigned PPE by task is completed by the RHSM that approved this plan. Below are items that need to be followed when using any form of PPE:

- Employees must be trained to properly wear and maintain the PPE.
- Employees must be trained in the limitations of the PPE.
- In work areas where actual or potential hazards are present at any time, PPE must be worn by employees working or walking through the area.
- Areas requiring PPE should be posted or employees must be informed of the requirements in an equivalent manner.
- PPE must be inspected prior to use and after any occurrence to identify any deterioration or damage.
- PPE must be maintained in a clean and reliable condition.
- Damaged PPE shall not be used and must either be repaired or discarded.
- PPE shall not be modified, tampered with, or repaired beyond routine maintenance.

The employer shall identify actual or potential hazards and the need for PPE. The following two conditions typically dictate the necessity for PPE: general hazards present in the work area, and hazards created by the tasks being performed. Some work areas have actual or potential hazards that can be present at any time, thereby potentially exposing any personnel working or walking through the area. Such areas should be posted as PPE-required areas, or personnel should be informed of the requirements in an equivalent manner. In addition, the actual task being performed may create a hazard and require personnel who perform this task to wear appropriate PPE. The areas where the tasks are taking place may become PPE-required areas as long as that specific task is taking place. Specific hazardous assessments are conducted through the AHA process, and thus AHAs become the daily tool for proper hazard assessment and mitigation. The following table should be used as a general minimum guideline, with the specific task AHA having the final required protocol for PPE. AHAs are a living document, and should reflect changing site conditions.

Table 14-1 outlines PPE to be used according to task, based on project-specific hazard assessment. If a task other than the tasks described in this table needs to be performed, contact the RHSM so this table can be updated.

TABLE 14-1
Project-specific Personal Protective Equipment Requirements[a]

Task	Level	Body	Head	Respirator[b]
Avoidance	Modified D	Boots: Safety-toe, leather boots (small demo), Safety -toe, leather work boots with outer rubber boot covers (large demo)	Hardhat [c] Safety glasses with	None required

TABLE 14-1
Project-specific Personal Protective Equipment Requirements[a]

Task	Level	Body	Head	Respirator[b]
		Gloves: Inner surgical-style nitrile & outer chemical-resistant nitrile gloves. Work Clothes or Coveralls. SC to determine body protection based on potential contact with site contaminants.in drill cuttings or excavated material If outer layer of personal clothing cannot be kept clean, then outer cotton coveralls or uncoated Tyvek coveralls shall be worn. (Polycoated Tyvek when there is potential to contact contaminated groundwater or free liquids from drums.)	side shields Ear protection [d]	
Work near vehicular traffic ways or earth moving equipment.	All	Appropriate level of ANSI/ISEA 107-2010 high-visibility safety vests.	Work near vehicular traffic ways or earth moving equipment.	
Tasks requiring upgrade (contact RHSM prior to upgrading)	C	**Coveralls:** Polycoated Tyvek® Boots: Safety -toe, chemical-resistant boots OR Safety -toe, leather work boots with outer rubber boot covers Gloves: Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Splash shield [c] Ear protection [d] Spectacle inserts	Air-purifying respirator, full face, MSA Ultratwin or equivalent; [TBD depentant on COC, contact RHSM] [e].
Tasks requiring upgrade (contact RHSM prior to upgrading)	B	**Coveralls:** Polycoated Tyvek® **Boots:** Safety -toe, chemical-resistant boots OR Safety -toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Splash shield [c] Ear protection [d] Spectacle inserts	Positive-pressure demand SCBA; MSA Ultralite, or equivalent.

Reasons for Upgrading or Downgrading Level of Protection (with approval of the RHSM)

Upgrade[f]	Downgrade
• Request from individual performing tasks. • Change in work tasks that will increase contact or potential contact with hazardous materials. • Occurrence or likely occurrence of gas or vapor emission. • Known or suspected presence of dermal hazards. • Instrument action levels in the “Site Monitoring” section exceeded.	• New information indicating that situation is less hazardous than originally thought. • Change in site conditions that decrease the hazard. • Change in work task that will reduce contact with hazardous materials.

Notes:

[a] Modifications are as indicated. CH2M HILL will provide PPE only to CH2M HILL employees.

[b] No facial hair that would interfere with respirator fit is permitted.

[c] Hardhat and splash-shield areas are to be determined by the SC.

[d] Ear protection should be worn when conversations cannot be held at distances of 3 feet (1 meter) or less without shouting.

[e] See cartridge change-out schedule.

[f] Performing a task that requires an upgrade to a higher level of protection (for example, Level D to Level C) is permitted only when the PPE requirements have been approved by the RHSM, and an SC qualified at that level is present.

14.2 Respiratory Protection

(Reference Section 05.E.03, EM 385-1-1 and CH2M HILL SOP HSE-121, *Respiratory Protection*)

14.2.1 General

Respiratory protection is not anticipated to be required at this project site based on the current scope of work. If the parameters change, or unforeseen circumstances dictate the use of respiratory protection, the following guidelines will be adhered to.

14.2.2 Voluntary Usage

CH2M HILL has a regulatory-compliant Voluntary Usage Program for employees and workers who feel that they may want to wear a respirator, even when the situation and conditions do not require their use for protection. Any employee or worker can approach their supervisor or SSHO to have a respirator provided if so desired. Additional training and medical screening will be required to be performed in the event the user does want to wear a respirator.

14.2.3 Air Purifying Respirators

CH2M HILL employees and subcontractors will be required to use air-purifying respirators (APRs) under the following conditions and operations:

- Operations where the concentration of substance or vapor is known
- There is a filter available that is National Institute of Occupational Safety and Health/Mine Safety and Health Administration rated for the substance or material that poses the hazard

14.2.4 Filter Selection and Change Schedule

If, during the course of the project, the situation arises that would require the use of APRs, the site safety coordinator (SSC) will contact CH2M HILL corporate Health and Safety to acquire the appropriate atmospheric monitoring equipment to determine the type of respirator cartridges needed. Once determined, a cartridge change schedule will be established based on the analytical data collected.

14.2.5 Fit Testing

All personnel required to wear either a self-contained breathing apparatus (SCBA) or APR during the project will be fit-tested in accordance with the CH2M HILL SOP. An operator seal check will be performed each time the respirator is placed on the operator's face for use.

Implement the following when using respiratory protection:

- Respirator users must have completed appropriate respirator training within the past 12 months. Level C training is required for the use of APRs, and Level B training is required for supplied-air respirators and SCBA use. Specific training is required for the use of powered air-purifying respirators.
- Respirator users must complete the respirator medical monitoring protocol and been approved for the specific type of respirator to be used.
- Tight-fitting facepiece respirator (negative or positive pressure) users must have passed an appropriate fit test within past 12 months.
- Respirator use shall be limited to those activities identified in this plan. If site conditions change and alter the effectiveness of the specified respiratory protection, the RHSM shall be notified to amend the written plan.
- Tight-fitting facepiece respirator users shall be clean-shaven and shall perform a user seal-check before each use.

- Canisters/cartridges shall be replaced according to the change-out schedule specified in this plan. Respirator users shall notify the SSHO or RHSM of any detection of vapor or gas breakthrough. The SSHO shall report any breakthrough events to the RHSM for schedule upgrade.
- Respirators in regular use shall be inspected before each use and during cleaning.
- Respirators in regular use shall be cleaned and disinfected as often as necessary to ensure they are maintained in a clean and sanitary condition.
- Respirators shall be properly stored to protect against contamination and deformation.
- Field repair of respirators shall be limited to routine maintenance. Defective respirators shall be removed from service.
- When breathing air is supplied by cylinder or compressor, the SSHO or RHSM shall verify the air meets Grade D air specifications.
- The SSHO or designee shall complete the Self-Assessment Checklist – Respiratory Protection included in as attachment to this plan to verify compliance with CH2M HILL's respiratory protection program.

Respirator Changeout Schedule

TABLE 14-2
Respirator Changeout Schedule

Contaminant	Changeout Schedule
TCE	TBD
Cis 1, 2-DCE	TBD
VC	TBD

SECTION 15

Worker Training and Qualification

15.1 CH2M HILL Worker Training

The intent of employee training program is to ensure that employees receive the appropriate level of training to conduct their work in a safe manner and to comply with applicable regulations. All employees are required to maintain the training qualification necessary to perform their assigned duties and job functions. (Reference CH2M HILL SOP HSE-110, *Training.*)

15.1.1 Hazardous Waste Operations Training

All employees engaging in HAZWOPER shall receive appropriate training as required by 29 CFR 1910.120 and 29 CFR 1926.65. At a minimum, the training shall have consisted of instruction in the topics outlined in 29 CFR 1910.120 and 29 CFR 1926.65. Personnel who have not met these training requirements shall not be allowed to engage in HAZWOPER activities.

15.1.1.1. Initial Training

General site workers engaged in hazardous waste operations shall, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations, unless otherwise noted in the above-referenced standards.

Employees who may be exposed to health hazards or hazardous substances at treatment, storage, and disposal operations shall receive a minimum of 24 hours of initial training to enable the employee to perform their assigned duties and functions in a safe and healthful manner.

Employees engaged in emergency response operations shall be trained to the level of required competence in accordance with 29 CFR 1910.120.

15.1.1.2. Three-day Actual Field Experience

General site workers for hazardous waste operations shall have received 3 days of actual experience (on-the-job training) under the direct supervision of a trained, qualified supervisor, and shall be documented. If the field experience has not already been received and documented at a similar site, the supervised experience shall be accomplished and documented at the beginning of the assignment of the project.

15.1.1.3. Refresher Training

General site workers and treatment, storage, and disposal workers shall receive 8 hours of refresher training annually (within the previous 12-month period) to maintain qualifications for fieldwork. Employees engaged in emergency response operations shall receive annual refresher training of sufficient content and duration to maintain their competencies or shall demonstrate competency in the areas at least annually.

15.1.1.4. Eight-hour Supervisory Training

Onsite management or supervisors who will be directly responsible for, or supervise employees engaged in hazardous waste site operations, will have received at least 8 hours of additional specialized training in managing such operations. Employees designated as Safety Coordinator—Hazardous Waste are considered 8-hour HAZWOPER Site Safety Supervisor-trained.

15.1.2 First-aid/Cardiopulmonary Resuscitation

First-aid and CPR training consistent with the requirements of a nationally recognized organization such as the American Red Cross Association or National Safety Council shall be administered by a certified trainer. A minimum of two personnel per active field operation will have first-aid and CPR training. Bloodborne pathogen training located on CH2M HILL's Virtual Office is also required for those designated as first-aid/CPR trained.

15.1.3 Site Safety and Health Officer Training

SSHOs are trained to implement the HSE program on CH2M HILL field projects. A qualified SSHO is required to be identified in the SSHSP for CH2M HILL field projects. SSHOs must also meet the requirements of the worker category appropriate to the type of field project (construction or hazardous waste). In addition, the SSHOs shall have completed additional safety training required by the specific work activity on the project that qualifies them to implement the HSE program (for example, fall protection, excavation). All SSHO's shall also have completed 30-hour OSHA construction safety training, and have the requisite experience to oversee the tasks assigned. Furthermore, the SSHO shall have an understanding of the USACE EM385-1-1 Safety Manual.

15.1.4 Site-specific Training

Prior to commencement of field activities, all field personnel assigned to the project will have completed site-specific training that will address the contents of applicable HSPs, including the activities, procedures, monitoring, and equipment used in the site operations. Site-specific training will also include site and facility layout, potential hazards, risks associated with identified emergency response actions, and available emergency services. The training allows fieldworkers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and work operations for their particular activity.

15.1.5 Project-Specific Training Requirements

Project-specific training for this project includes the following:

- APPs-SSHPs/AHAs

15.2 Project Employee Orientation

Employees expecting to access the site are required to have the project employee orientation. The training will be provided by the SSC. The training provided to the employees in the employee orientation shall include the following:

- Review the SSHP and APP
- Present an overall site safety briefing (general site safety)
- Review employee responsibilities
- Review AHA policies and procedures
- Review emergency procedures and evacuation plan
- Review injury and incident reporting procedures
- Review reporting procedures for hazardous conditions and/or hazardous activities

15.3 Personal Protective Equipment Training

OSHA requires each PPE user to receive training on the proper care, maintenance, limitations, and instructions on how to wear and adjust PPE. The proper use of PPE will also be included in project safety briefings and toolbox meetings.

15.4 Safety Meetings and Toolbox Meetings

Safety meetings provide a method for maintaining safety awareness and providing safety-related information and training to employees. Safety meetings for project supervisory personnel and project employees shall be held at least daily, and include relevant information for on- and off-the-job safety.

15.5 Activity Hazard Analysis Training

Each supervisor will review task-specific AHAs with all workers assigned to perform that task prior to the beginning of that task anywhere on the job site. All workers will sign the AHA document signifying they have been trained and understand the task steps, hazards, and hazard controls to be used.

15.6 Safety Pre-task Planning and Training

Each day, the onsite supervisors shall hold informational safety training with each member of their crew. Information discussed and training performed shall pertain to current project activities and scope of work. The subcontractor is encouraged to use the time for employee input and task-specific training.

15.7 Emergency Response Plan Training

Emergency Response Plan training will occur during the employee orientation and retraining will occur periodically in safety meetings. The Emergency Response Plan training will include evacuation alarms, site evacuation, designated evacuation assembly areas, and route to emergency medical facility. Emergency drills will be performed initially, but at least twice yearly. See Section 19 for the Emergency Preparedness procedures.

15.8 Conduct of Training

15.8.1 Instructor/Trainer Requirements

All personnel who will conduct training will have documented expertise in the areas of which they will be conducting the training, and knowledge of the regulatory and other requirements. They will also be listed as a competent person in that area by the employer or contractor.

15.8.2 Initial Training

All employees will have documentation of initial training required to perform their assigned duties with their assigned tools and equipment. If previous documentation or subcontractor certification is not available, then initial training will take place onsite prior to the employee commencing work.

15.8.3 Retraining

Retraining will be required under the following conditions:

- There is a change in operations or equipment capabilities.
- An employee is seen performing an unsafe act, or operating equipment or machinery in an unauthorized manner.
- There is an incident or accident on the job site.
- Anytime the regulatory requirements require refresher training due to time periods, such as HAZWOPER, etc.

15.8.4 Demonstrated Competency

For all training conducted for equipment, machinery, or hazardous activities, the trainer will document in writing that the individual has “demonstrated competency” in the areas required to perform their assigned tasks safely and in compliance with the regulatory and other guidance.

15.9 Documentation

All training shall be documented. Documentation and certificates verifying completion will be maintained onsite by the employer, and copies of the training documentation will be submitted to the Health and Safety Manager. Training documentation will be made available for review at all times.

SECTION 16

Medical Surveillance and Qualification

(Reference CH2M HILL SOP HSE-113, *Medical Surveillance*

All site workers participating in HAZWOPER will maintain an adequate medical surveillance program in accordance with 29 CFR 1910.120 or 29 CFR 1926.65 and other applicable OSHA standards. Documentation of employee medical qualification (for example, physician's written opinion) will be maintained in the project files and made available for inspection.

16.1 Hazardous Waste Operations and Emergency Response

CH2M HILL personnel expected to participate in onsite HAZWOPER tasks are required to have a current medical qualification for performing this work. Medical qualification shall consist of a qualified physician's written opinion regarding fitness for duty at a hazardous waste site, including any recommended limitations on the employee's assigned work. The physician's written opinion shall state whether the employee has any detected medical conditions that would place the employee at increased risk of material impairment of the employee's health from work in HAZWOPER, or from respirator use.

16.2 Job- or Site-specific Medical Surveillance

Due to the nature of hazards for a particular job or work site, specialized medical surveillance may be necessary. This surveillance could include biological monitoring for specific compounds, or specialized medical examinations.

Site-specific medical surveillance includes:

- None necessary

16.3 Respirator User Qualification

Personnel required to wear respirators must have a current medical qualification to wear respirators. Medical qualification shall consist of a qualified physician's written opinion regarding the employee's ability to safely wear a respirator in accordance with 29 CFR 1910.134.

16.4 Hearing Conservation

Personnel working in hazardous waste operations or operations that fall under 29 CFR 1910.95 and exposed to noise levels in excess of the 85 dBA time-weighted average shall be included in a hearing-conservation program that includes annual audiometric testing.

SECTION 17

Site Control Plan

17.1 Site Control Procedures

(Reference CH2M HILL SOP HSE-218, *Hazardous Waste Operations)*

Site control is established to prevent the spread of contamination throughout the site and to ensure that only authorized individuals are permitted into potentially hazardous areas.

The SSHO will implement site control procedures, including the following bulleted items:

- Establish support, contamination reduction, and exclusion zones. Delineate with flags or cones as appropriate. Support zone should be upwind of the site. Use access control at entry and exit from each work zone.
- Establish onsite communication consisting of the following:
  - Line-of-sight and hand signals
  - Air horn
  - Two-way radio or cellular telephone if available
- Establish offsite communication.
- Establish and maintain the “buddy system.”

17.2 Remediation Work Area Zones

(Reference CH2M HILL SOP HSE-218 Hazardous Waste Operations)

A three-zone approach will be used to control areas where site contaminants exist. Access will be allowed only after verification of appropriate training and medical qualification. The three-zone approach shall include an exclusion zone (EZ), contamination reduction zone (CRZ), and a support zone (SZ). The three-zone approach is not required for construction work performed outside contaminated areas where control of site contamination is not a concern.

Specific work control zones shall be established as necessary during task planning. Site work zones should be modified in the field as necessary, based on such factors as equipment used, air monitoring results, environmental conditions, or alteration of work plans. The following guidelines shall be used for establishing and revising these preliminary zone designations.

17.2.1 Support Zone

The SZ is an uncontaminated area (trailers, offices, field vehicles, etc.) that will serve as the field support area for most operations. The SZ provides field team communications and staging for emergency response. Appropriate sanitary facilities and safety and emergency response equipment will be located in this zone. Potentially contaminated personnel/materials are not allowed in this zone. The only exception will be appropriately packaged and decontaminated materials, or personnel with medical emergencies that cannot be decontaminated.

17.2.2 Contamination Reduction Zone

The CRZ is established between the EZ and the SZ, upwind of the contaminated area where possible. The CRZ provides an area for decontamination of personnel, portable handheld equipment and tools, and heavy equipment. In addition, the CRZ serves as access for heavy equipment and emergency support services.

17.2.3 Exclusion Zone

The EZ is where activities take place that may involve exposure to site contaminants and/or hazardous materials or conditions. This zone shall be demarcated to prevent unauthorized entry. More than one EZ may be established if there are different levels of protection to be employed or different hazards that exist in the same work area. The EZ shall be large enough to allow adequate space for the activity to be completed, including field personnel and equipment, as well as necessary emergency equipment.

The EZ shall be demarcated with some form of physical barrier or signage. The physical barrier or signage shall be placed so that it is visible to personnel approaching or working in the area. Barriers and boundary markers shall be removed when no longer needed.

17.2.4 Other Controlled Areas

Other work areas may need to be controlled due to the presence of an uncontrolled hazard, to warn workers of requirements, or to prevent unauthorized entry. Examples include general construction work areas, open excavations, high noise areas, vehicle access areas, and similar activities or limited access locations. The areas shall be clearly demarcated with physical barriers (fencing, cones, reinforced caution tape, or rope) as necessary and posted with appropriate signage.

SECTION 18

Decontamination

(Reference CH2M HILL SOP HSE-218, *Hazardous Waste Operations*)

Decontamination areas will be established for work in potentially contaminated areas to prevent the spread of contamination. Decontamination areas should be located upwind of the exclusion zone where possible and should consider any adjacent or nearby projects and personnel. The SC must establish and monitor the decontamination procedures and their effectiveness. Decontamination procedures found to be ineffective will be modified by the SC. The SC must ensure that procedures are established for disposing of materials generated on the site.

No eating, drinking, or smoking is permitted in contaminated areas and in exclusion or decontamination zones. The SC should establish areas for eating, drinking, and smoking.

18.1 Contamination Prevention

Preventing or avoiding contamination of personnel, tools, and equipment will be considered in planning work activities at all field locations. Good contamination prevention and avoidance practices will assist in preventing worker exposure and result in a more efficient decontamination process. Procedures for contamination prevention and avoidance include the following:

- Do not walk through areas of obvious or known contamination.
- Do not directly handle or touch contaminated materials.
- Make sure there are no cuts or tears in PPE.
- Fasten all closures in suits and cover them with duct tape, if appropriate.
- Take particular care to protect any skin injuries.
- Stay upwind of airborne contamination, where possible.
- Do not eat or drink in contaminated work areas.
- Do not carry food, beverages, tobacco, or flame-producing equipment into contaminated work areas.
- Minimize the number of personnel and amount of equipment in contaminated areas to that necessary for accomplishing the work.
- Choose tools and equipment with nonporous exterior surfaces that can be easily cleaned and decontaminated.
- Cover monitoring and sampling equipment with clear plastic, leaving openings for the sampling ports, as necessary.
- Minimize the amount of tools and equipment necessary in contaminated areas.

18.2 Personnel and Equipment Decontamination

Personnel exiting an EZ must ensure that they are not spreading potential contamination into clean areas or increasing their potential for ingesting or inhaling potential contaminants. Personal decontamination may range from removing outer gloves as exiting the EZ, to proceeding through an outer layer doffing station, including a boot and glove wash and rinse, washing equipment, etc. Equipment that has come into contact with contaminated media must also be cleaned/decontaminated when it is brought out of the EZ.

18.3 Decontamination during Medical Emergencies

Standard personnel decontamination practices will be followed whenever possible. For emergency life-saving first-aid and/or medical treatment, normal decontamination procedures may need to be abbreviated or omitted. In this situation, site personnel shall accompany contaminated victims to advise emergency response personnel on potential contamination present and proper decontamination procedures.

Outer garments may be removed if they do not cause delays, interfere with treatment, or aggravate the problem. Protective clothing can be cut away. If the outer garments cannot be safely removed, a plastic barrier between the individual and clean surfaces should be used to help prevent contaminating the inside of ambulances or medical personnel. Outer garments can then be removed at the medical facility.

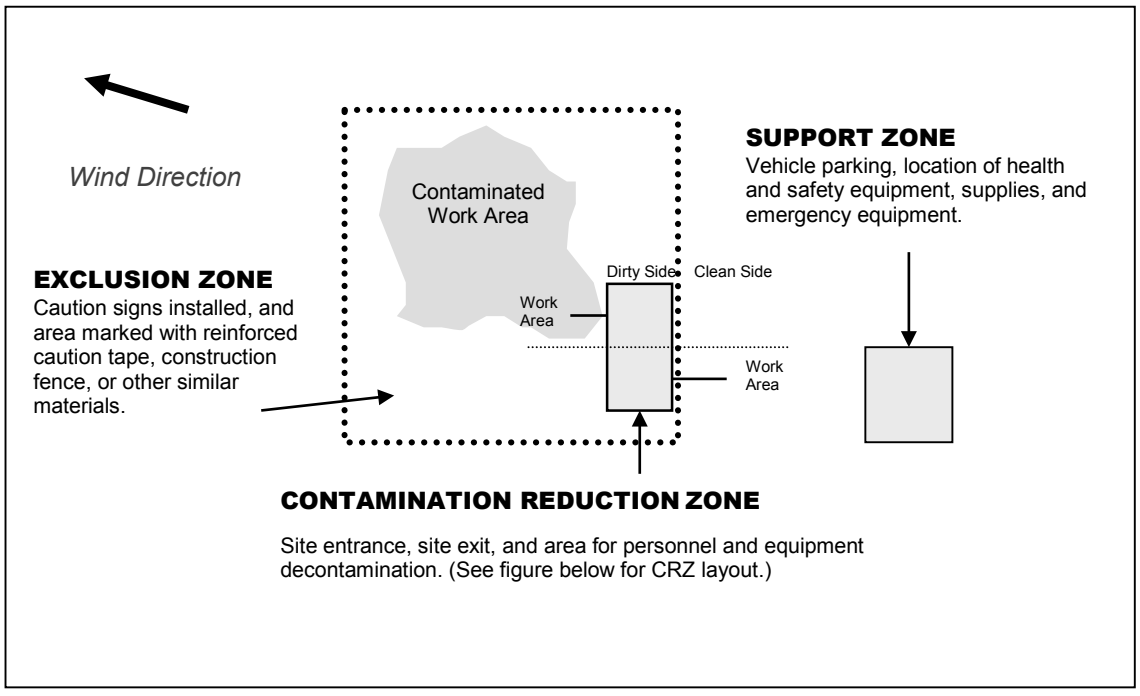
18.4 Waste Collection and Disposal

All contaminated material generated through the personnel and equipment decontamination processes (for example, contaminated disposable items, gross debris, liquids, and sludges) will be properly containerized, labeled, stored at a secure location, and disposed of in accordance with the project plans.

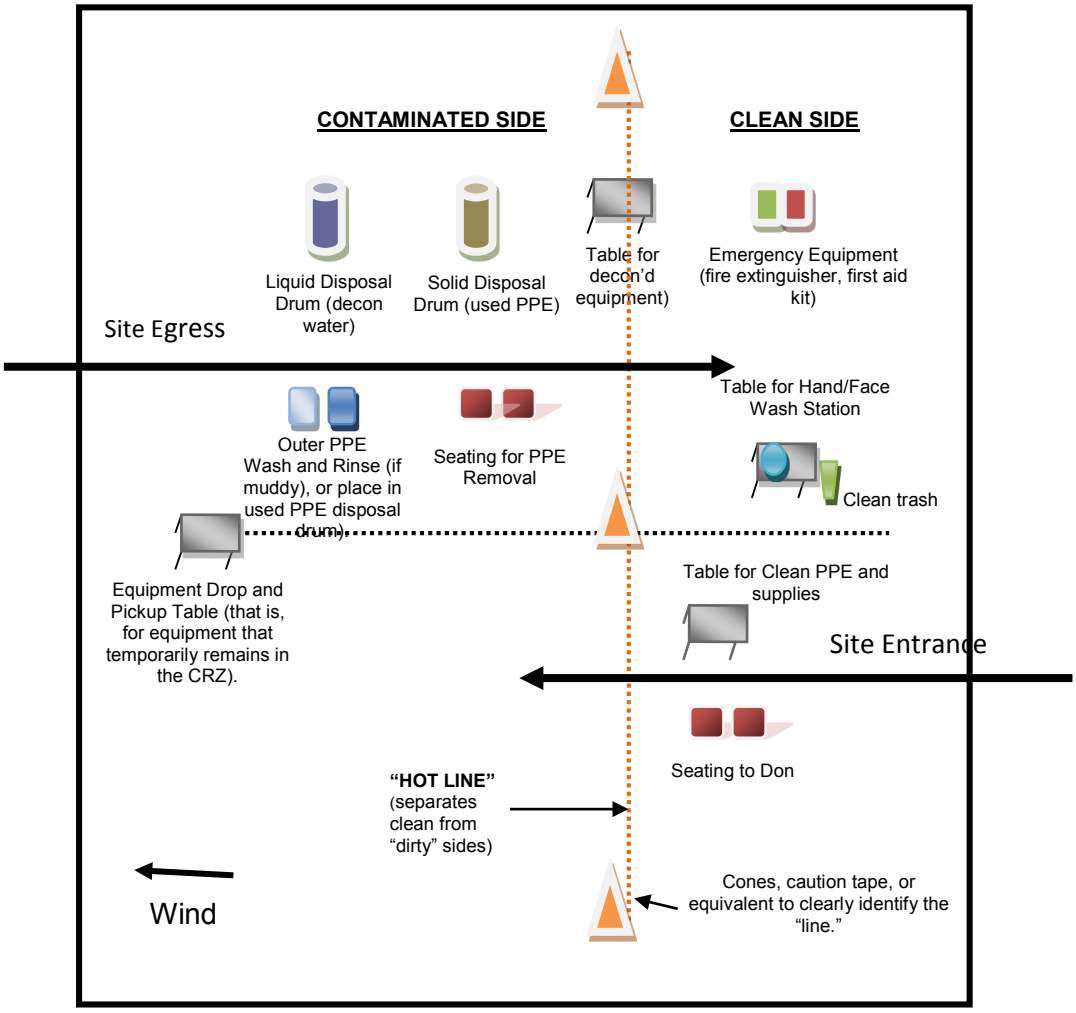
18.5 Diagram of Personnel-decontamination Line

The following figure illustrates a conceptual establishment of work zones, including the decontamination line. Work zones are to be modified by the SC to accommodate task-specific requirements.

Work Area—Set-up Appropriately Based On Wind Direction



Typical Contamination Reduction Zone



SECTION 19

Emergency Response Plan

(Reference CH2M HILL SOP HSE-106, *Emergency Planning*)

19.1 Pre-emergency Planning

The Emergency Response Coordinator (ERC), typically the SSHO or designee, performs the applicable pre-emergency planning tasks before starting field activities and coordinates emergency response with CH2M HILL onsite parties, the facility, and local emergency-service providers as appropriate. Pre-Emergency Planning activities performed by the ERC include the following:

- Review the facility emergency and contingency plans where applicable.
- Determine what onsite communication equipment is available (two-way radio and air horn).
- Determine what offsite communication equipment is needed (nearest telephone or cell phone).
- Confirm and post the "Emergency Contacts" page and route to the hospital located in this section in project trailer(s) and keep a copy in field vehicles along with evacuation routes and assembly areas. Communicate the information to onsite personnel and keep it updated.
- Field Trailers: Post "Exit" signs above exit doors, and post "Fire Extinguisher" signs above locations of extinguishers. Keep areas near exits and extinguishers clear.
- Review changed site conditions, onsite operations, and personnel availability in relation to emergency response procedures.
- Where appropriate and acceptable to the client, inform emergency room and ambulance and emergency response teams of anticipated types of site emergencies.
- Inventory and check site emergency equipment, supplies, and potable water.
- Communicate emergency procedures for personnel injury, exposures, fires, explosions, and releases.
- Rehearse the emergency response plan before site activities begin. This may include a "tabletop" exercise or an actual drill depending on the nature and complexity of the project. Drills should take place periodically but no less than once a year.
- Brief new workers on the emergency response plan.
- The ERC will evaluate emergency response actions and initiate appropriate follow-up actions.

19.2 Emergency Equipment and Supplies

The ERC shall ensure the following emergency equipment is on the site. Verify and update the locations of this equipment as needed. The equipment will be inspected in accordance with manufacturer's recommendations. The inspection shall be documented in a field logbook or similar means to be kept in the project files.

Emergency Equipment and Supplies	Location
20 (or two 10) class A,B,C fire extinguisher	Support vehicles
First-aid kit	Field vehicle
Eye wash	Field vehicle
Potable water	Field vehicle
Bloodborne-pathogen kit	Field vehicle
Additional equipment (specify): Cell phone	Field vehicle

19.3 Incident Response

In fires, explosions, or chemical releases, actions to be taken include the following:

- Notify appropriate response personnel.
- Shut down CH2M HILL operations and evacuate the immediate work area.
- Account for personnel at the designated assembly area(s).
- Assess the need for site evacuation, and evacuate the site as warranted.
- Implement HSE-111, Incident Notification, Reporting and Investigation.
- Notify and submit reports to clients as required in contract.

Small fires or spills posing minimal safety or health hazards may be controlled with onsite spill kits or fire extinguishers without evacuating the site. When in doubt evacuate. Follow the incident reporting procedures in the "Incident Notification, Reporting, and Investigation" section of this SSHP.

19.4 Emergency Medical Treatment

Emergency medical treatment is needed when there is a life-threatening injury (such as severe bleeding, loss of consciousness, breathing or heart has stopped). When in doubt, if an injury is life-threatening or not, treat it as needing emergency medical treatment.

- Notify 911 or other appropriate emergency response authorities as listed in the "Emergency Contacts" page located in this section.
- The ERC will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury, perform decontamination (if applicable) where feasible; lifesaving and first-aid or medical treatment takes priority.
- Initiate first-aid and CPR where feasible.
- Notify supervisor and if the injured person is a CH2M HILL employee, the supervisor will call the occupational nurse at 1-866-893-2514. Make other notifications as required by HSE SOP-111, *Incident Notification, Reporting and Investigation*.
- Make certain that the injured person is accompanied to the emergency room.
- Follow the Serious Incident Reporting process in HSE SOP-111, Incident Notification, Reporting, and Investigation, and complete incident report using the HITS system on the Virtual Office or if not feasible, use the hard copy forms provided as an attachment to this SSHP.
- Notify and submit reports to client as required in contract.

19.5 Evacuation

- Evacuation routes, assembly areas, and severe weather shelters (and alternative routes and assembly areas) are to be specified on the site map.
- Evacuation route(s) and assembly area(s) will be designated by the ERC or designee before work begins.
- Personnel will assemble at the assembly area(s) upon hearing the emergency signal for evacuation.
- The ERC and a "buddy" will remain on the site after the site has been evacuated (if safe) to assist local responders and advise them of the nature and location of the incident.
- The ERC will account for all personnel in the onsite assembly area.
- A designated person will account for personnel at alternate assembly area(s).

- The ERC will follow the incident reporting procedures in the "Incident Notification, Reporting, and Investigation" section of this HSP.

19.6 Evacuation Signals

Signal	Meaning
Grasping throat with hand	Emergency; help me.
Thumbs up	OK; understood.
Grasping buddy's wrist	Leave area now.
Continuous sounding of horn	Emergency; leave site now.

19.7 Firefighting Plan

(References: Section 01.E.01 & 06.A.02, EM 385-1-1 and CH2M HILL SOP HSE-208, *Fire Prevention*)

Small fires posing minimal safety or health hazards may be controlled with onsite fire extinguishers without evacuating the site. When in doubt evacuate. Follow the incident reporting procedures in the "Incident Notification, Reporting, and Investigation" section of this SSHP.

19.7.1.1. Location of Fire Extinguishers

Fire extinguishers will be located around the project sites as required in the following places at a minimum:

- In each vehicle
- Near areas where flammable materials are stored or in use

All fire extinguishers will be kept clearly visible, marked, and placed where they are easily accessible.

19.8 Inclement Weather

Sudden inclement weather can rapidly encroach upon field personnel. Preparedness and caution are the best defenses. Field crew members performing work outdoors should carry clothing appropriate for inclement weather. Personnel are to take heed of the weather forecast for the day and pay attention for signs of changing weather that indicate an impending storm. Signs include towering thunderheads, darkening skies, or a sudden increase in wind. If stormy weather ensues, field personnel should discontinue work and seek shelter until the storm has passed.

Protective measures during a lightning storm include seeking shelter; avoiding projecting above the surrounding landscape (don't stand on a hilltop—seek low areas); staying away from open water, metal equipment, railroad tracks, wire fences, and metal pipes; and positioning people several yards apart. Some other general precautions include the following:

- Know where to go and how long it will take to get there. If possible, take refuge in a large building or vehicle. Do not go into a shed in an open area.
- The inclination to see trees as enormous umbrellas is the most frequent and most deadly mistake. Do not go under a large tree that is standing alone. Likewise, avoid poles, antennae, and towers.
- If the area is wide open, go to a valley or ravine, but be aware of flash flooding.
- If you are caught in a level open area during an electrical storm and you feel your hair stand on end, drop to your knees, bend forward and put your hands on your knees or crouch. The idea is to make yourself less vulnerable by being as low to the ground as possible and taking up as little ground space as possible. Lying down is dangerous, since the wet earth can conduct electricity. Do not touch the ground with your hands.
- Do not use telephones during electrical storms, except in the case of emergency.

Remember that lightning may strike several miles from the parent cloud, so work should be stopped and restarted accordingly. The lightning safety recommendation is 30-30: Seek refuge when thunder sounds within 30 seconds after a lightning flash; and do not resume activity until 30 minutes after the last thunder clap.

High winds can cause unsafe conditions, and activities should be halted until wind dies down. High winds can also knock over trees, so walking through forested areas during high-wind situations should be avoided. If winds increase, seek shelter or evacuate the area. Proper body protection should be worn in case the winds hit suddenly, because body temperature can decrease rapidly.

19.8.1 Tornado Safety

Recognizing imminent tornado signs include seeing an unusually dark sky, possibly with some green or yellow clouds. You may hear a roaring or rumbling sound like a train, or a whistling sound like a jet. Large hail may also be falling. You may be able to see funnels, or they may be hidden by rain or hail.

Listen to your radio for tornado warnings during bad thunderstorms. If a tornado warning is issued, don't panic. Instead, listen and look. Quickly but calmly follow directions for getting to shelter.

Take cover. Indoors, you should go down into the basement and crouch down under the stairs, away from windows. Do not take an elevator. If you can't get to a basement, go into a closet or bathroom and pull a mattress over you or sit underneath a sturdy piece of furniture on the ground floor near the center of the building. Pull your knees up under you and protect your head with your hands.

A bad place to be in a tornado is in a building with a large freestanding roof such as a gymnasium, arena, auditorium, church, or shopping mall. If you are caught in such a building, take cover under something sturdy.

More than half of tornado deaths occur in mobile homes. If a tornado threatens, get out and go to a building with a good foundation, or lay down in a ditch away from vehicles and other objects.

If you are driving, get to a shelter, lie down in a ditch or seek cover up under the girders of an overpass or bridge. Stay as close to the ground as you can. Protect your head and duck from flying debris.

Stay away from metal and electrical equipment because lightning accompanies tornadoes.

If you have time before the tornado strikes, secure objects such as garbage cans and lawn furniture which can injure people. While most tornado damage is a result of the violent winds, most injuries and deaths actually result from flying debris.

Emergency Contacts

24-hour CH2M HILL Injury Reporting – 1-866-893-2514
24-hour CH2M HILL Serious Incident Reporting Contact – 720-286-4911

Medical Emergency
Naval Support Facility – Indian Head
(301) 744-4333 *
If in restricted area, use red call boxes – no cell phone usage in restricted area!
***Identify name, nature of your emergency and exact location.**

NAVFAC POC:
Joseph Rail: (202) 685-3105
Joseph.Rail@navy.mil, NAVFAC Washington Remedial Project Manager

CH2M HILL Medical Consultant
WorkCare
Dr. Peter Greaney, M.D.
300 S. Harbor Blvd, Suite 600
Anaheim, CA 92805
800-455-6155/866-893-2514
714-978-7488

Fire/Spill Emergency –**(301) 744-4333 ***
If in restricted area, use red call boxes – no cell phone usage in restricted area!
***Identify name, nature of your emergency and exact location.**

CH2M HILL Director – Health, Safety, Security & Environment
Andy Strickland/DEN
Cell: 720-480-0685
Office: 720-286-2393

Security & Police – **(301) 744-4333 ***
If in restricted area, use red call boxes – no cell phone usage in restricted area!
***Identify name, nature of your emergency and exact location.**

CH2M HILL Responsible Health and Safety Manager (RHSM)
Name: Mark Orman
Phone: 865-560-2825

Utilities Emergency Phone Numbers
On base: Nicholas Carros
Phone: 301-744-2263

CH2M HILL Human Resources Department
Phone: Employee Connect toll-free number
1-877-586-4411
(U.S. and Canada)

CH2M HILL PM
Name: Margaret Kasim
Phone: wk 703-376-5154

CH2M HILL Worker's Compensation:
Contact Business Group Human Resources dept. to have form completed

CH2M HILL Safety and Health Officer (SSHO)
Name: Nelson Figeac
Phone: 757-288-0374

Media Inquiries Corporate Strategic Communications
Name: John Corsi
Phone: (720) 286-2087

CH2M HILL Project Environmental Manager
Name: Hope Wilson
Phone: wk 678-530-4226, cell 678-656-5411

Automobile Accidents
Mary Ellegood-Oberts/DEN (720-286-2291);
See vehicle accident guidance fact sheet

Federal Express Dangerous Goods Shipping
Phone: 800/238-5355

CHEMTEL (hazardous material spills)
Phone: 800/255-3924

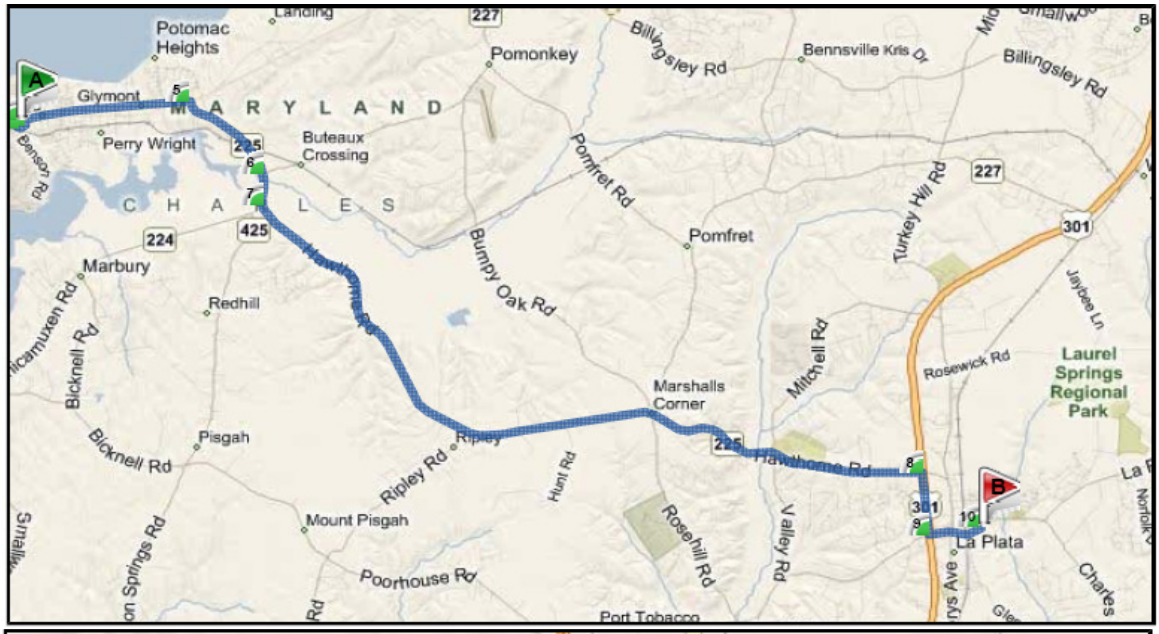
Facility Alarms:
Sound vehicle horn three times. (Site 17)
Air raid horn type siren (NSF-IH facility)

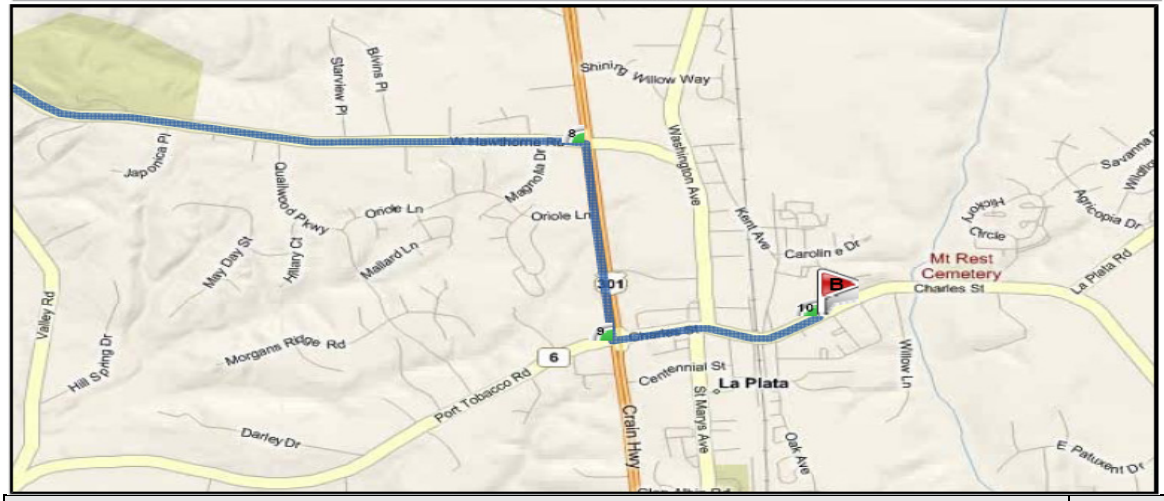
Evacuation Assembly Area(s): TBD daily by SC based on predominant wind direction

Facility/Site Evacuation Route(s): TBD daily by SC based on predominant wind direction

Directions to Local Hospital

Local Hospital Civisita Medical Hospital, 701 Charles Drive, La Plata, MD 20646 (301)-609-4000





Directions	Distance
1) From Map Point A (4050 Indian Head Way – Indian Head, MD Post Office) depart on SR-210 South (Indian Head Highway) toward Mattingly Ave and turn LEFT on East Mattingly Ave	~ 0.2 mile
2) Turn LEFT on Town St and then immediately turn RIGHT onto SR-210 North (Indian Head Highway)	~ 1.9 miles
3) Turn Right (south) on SR-225/Hawthorne Road	~ 1.2 miles
4) Keep Straight onto SR-224/SR-225/Hawthrone Road	~ 0.4 mile
5) Bear Left (southeast) on SR-225, Hawthorne Road	~ 9.0 miles
6) Turn Right (south) onto US-301 South (Crane Highway.)	~ 0.7 mile
7) Turn Left (East) on SR-6 then stay straight on SR-6 (East Charles Street)	~ 0.6 mile
8) Arrive at Civista Medical Center, 701 Charles Drive, La Plata, MD	0 feet

SECTION 20

Spill Containment Procedures

CH2M HILL and subcontractor personnel working at the project site shall be knowledgeable of the potential health, safety, and environmental concerns associated with petroleum and other substances that could potentially be released at the project site.

The following is a list of criteria that must be addressed in CH2M HILL's or the subcontractor's plans in the event of a spill or release. In the event of a large-quantity spill, notify emergency services. Personnel discovering a spill shall (only if safe to do so):

- Stop or contain the spill immediately (if possible) or note source. Shut off the source (for example, pump, treatment system) if possible. If unsafe conditions exist, then leave the area, call emergency services, inform nearby personnel, notify the site supervisors, and initiate incident reporting process. The SSHO shall be notified immediately.
- Extinguish sources of ignition (flames, sparks, hot surfaces, or cigarettes).
- Clear personnel from the spill location and barricade the area.
- Use available spill control equipment in an effort to ensure that fires, explosions, and releases do not occur, recur, or spread.
- Use sorbent materials to control the spill at the source.
- Construct a temporary containment dike of sorbent materials, cinder blocks, bricks or other suitable materials to help contain the spill.
- Attempt to identify the character, exact source, amount, and extent of the released materials. Identification of the spilled material should be made as soon as possible so that the appropriate cleanup procedure can be identified.
- Contact the RHSM and project EM in the event of a spill or release immediately so evaluation of reportable quantity requirements and whether agency reporting is required.
- Assess possible hazards to human health or the environment as a result of the release, fire or explosion.
- Follow incident notification, reporting, and investigation section of this plan.

SECTION 21

Inspections

21.1 Management Health, Safety, Security, and Environment Inspections

The Management Inspection Checklist (attached to this plan) is intended to facilitate PM leadership, provide an opportunity for PM's to mentor field staff on HSE and identify any big picture actions that need to be addressed. Observations that would improve global HSE program should also be included on the form. This checklist does NOT take the place of a formal HSE audit. The PM shall:

- Complete one checklist per month during fieldwork when visiting the site. The PM may delegate completion to the task lead, field team leader, or construction manager if the project is short duration and a visit is not planned for.
- Complete applicable sections of the checklist (can by typed or hand-written). Address issues with the field team, taking the opportunity to mentor staff by identifying the "root cause" of observation (for example, why are safe behavior observations not being completed, had this hazard been noted by any other team members?).
- Send completed form to Project Delivery Manager, Sector HSE Lead, and RHSM for tracking and review. Original should be kept in the project files.

21.2 Project Activity Self-assessment Checklists

In addition to the hazard controls specified in this document, Project Activity Self-assessment Checklists are contained as an attachment to this SSHP. The Project Activity Self–assessment Checklists are based upon minimum regulatory compliance and some site-specific requirements may be more stringent. The objective of the self-assessment process is to identify gaps in project safety performance, and prompt for corrective actions in addressing these gaps. The self-assessment checklists, including documented corrective actions, shall be made part of the permanent project records and maintained by the SSHO.

The self-assessment checklists will also be used by the SSHO in evaluating the subcontractors and any client contractors' compliance onsite.

The self-assessment checklists for the following tasks and exposures are required when the task or exposure is initiated and weekly thereafter while the task or exposure is taking place. The checklists shall be completed by the SSHO or other CH2M HILL representative and maintained in project files.

- Biological
- Drilling
- PPE

21.3 Safe Behavior Observations

Safe behavior observations (SBOs) are a tool to be used by supervisors to provide positive reinforcement for work practices performed correctly, while also identifying and eliminating deviations from safe work procedures that could result in a loss.

The SSHO or designee shall perform at least one SBO each week.

The SSHO or designee shall complete the SBO form (attached to this SSHP) for the task/operation being observed and submit them weekly.

For federal projects, SBOs may be submitted electronically by e-mailing them to the address, "CH2M HILL ES FED Safe Behavior Observations," when connected to the network or at CH2MHILLESFEDSafeBehaviorObservation@ch2m.com.

21.4 Deficiency Tracking System

21.4.1 Safe Behavior Observation Forms

All observed hazard forms will be completed onsite at the time of the observed hazard, or activity inspection. Both good behaviors and questionable or unsafe behaviors will be annotated on the form and discussed with the observed worker(s). Any unsafe behavior or acts observed will be documented in writing to the subcontractor's project manager for action. All observed hazard forms will become a permanent part of the project files.

21.4.2 Self-assessment Checklists

Any item that is annotated with a "NO" must be explained on the last sheet of the checklist, and followed up for corrective action. The last page of each checklist has a column for recording the date the deficiency was corrected. The self-assessment checklists—once completed and signed by the inspector, reviewed with the applicable supervisor and/or employee, and signed by the project manager—will become a permanent record of inspection and part of the project files.

21.4.3 Open Deficiencies

All self-assessment checklists with open deficiencies or stop work orders will be the top priority for the SSC each work day to ensure they are corrected, any training accomplished, or the situation corrected to close out the deficiency. If the deficiency is not handled in a timely manner, the SSC will report the problem in writing to the prime contractor PM.

A copy of the Safety and Occupational Health deficiency tracking log shall be mounted on or be adjacent to the bulletin board or a notice on the bulletin board shall state the location where it may be accessed by all workers upon request.

SECTION 22

Incident Notification, Reporting, and Investigation

(Reference CH2M HILL SOP HSE-111, *Incident Notification, Reporting and Investigation*)

22.1 General Information

This section applies to the following:

- All injuries involving employees, third parties, or members of the public
- Damage to property or equipment
- Interruptions to work or public service (hitting a utility)
- Incidents that attract negative media coverage
- Near misses
- Spills, leaks, or regulatory violations
- Motor vehicle accidents

Documentation, including incident reports, investigation, analysis, and corrective measure taken shall be kept by the SSHO and maintained onsite for the duration of the project.

22.2 Section Definitions

Incident: An incident is an event that causes or could have caused undesired consequences. An incident may be caused by natural forces, employees, subcontractors, or third parties in any location associated with CH2M HILL operations, including offices, warehouses, project sites, private property, or public spaces. Incidents include the following:

- Injury or illness to a CH2M HILL employee or subcontractor employee, or member of the public
- Property damage
- Spill or release
- Environmental requirement or permit violation
- A “near-miss”
- Other (for example, fire, explosion, bomb threat, workplace violence, threats)

Accident: An incident involving actual loss through injury, damage to assets, or environmental harm

Near Miss: A near-miss occurs when an intervening factor prevented an injury or illness, property damage, spill or release, permit violation, or other event from occurring. Examples of near-miss situations include the following: a hard hat or other PPE prevented an injury; secondary containment or emergency shutoff prevented a spill; or an alert coworker prevented an incident.

Serious Incident: A Serious Incident must be immediately reported to senior management includes the following:

- Work-related death, or life threatening injury or illness of a CH2M HILL employee, subcontractor, or member of the public
- Kidnap/missing person
- Acts or threats of terrorism
- Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than $ 500,000 in damage
- Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community, or the environment

22.3 Reporting Requirements

All employees and subcontractors' employees shall immediately report any incident (including "near misses," as defined in the section above) in which they are involved or witness to their supervisor.

The CH2M HILL or Subcontractor supervisor, upon receiving an incident report, shall inform his immediate superior and the CH2M HILL SSHO.

The SSHO shall immediately report the following information to the RHSM and PM by phone and e-mail:

- Project Name and Site Manager
- Date and time of incident
- Description of incident
- Extent of known injuries or damage
- Level of medical attention
- Preliminary root cause/corrective actions

If the incident was an environmental permit issue (potential permit noncompliance, other situation that result in a notice of violation) or a spill or release, contact the Project EM immediately so evaluation of reportable quantity requirements and whether agency reporting is required;

The CH2M HILL team shall comply with all applicable statutory incident reporting requirements such as those to OSHA, the police, or state federal environmental agency.

Be aware that many OSHA-designated states require reporting to the area OSHA office if one person is admitted to the hospital (for example, California and Washington); whereas, federal OSHA requires it if three or more are admitted.

22.4 HITS System and Incident Report Form

CH2M HILL maintains a HITS entry and/or IRF for all work-related injuries and illnesses sustained by its employees in accordance with recordkeeping and insurance requirements. A HITS entry and/or IRF will also be maintained for other incidents (property damage, fire, or explosion, spill, release, potential violation, and near misses) as part of our loss prevention and risk reduction initiative.

The SSHO shall complete an entry into the HITS database system located on CH2M HILL's Virtual Office (or if Virtual Office is not available, use the hard copy Incident Report Form and Root Cause Analysis Form and forward it to the RHSM) within 24 hours and finalize those forms within 3 calendar days.

22.5 Injury Management/Return-to-Work (for U.S./Puerto Rico-based CH2M HILL Staff Only)

(Reference CH2M HILL, SOP HSSE-124, Injury Management/Return-to-Work)

22.5.1 Background

The Injury Management Program has been established to provide orderly, effective, and timely medical treatment and return-to-work transition for an employee who sustains a work-related injury or illness. It also provides guidance and assistance with obtaining appropriate treatment to aid recovery, keep supervisors informed of employee status, and to quickly report and investigate work-related injury/illnesses to prevent recurrence.

To implement the Injury Management/Return-to-Work Program successfully, supervisors and/or SC should:

- Ensure employees are informed of the Injury Management/Return-to-Work Program.
- Become familiar with the Notification Process (detailed below).
- Post the Injury Management/Return-to-Work Notification Poster.

22.5.2 The Injury Management/Return-to-Work Notification Process:

- Employee informs their supervisor.
- Employee calls the Injury Management Program toll free number 1-866-893-2514 immediately and speaks with the Occupational Injury Nurse. This number is operable 24 hours per day, 7 days a week.
- Supervisor ensures employee immediately calls the Injury Management Program number. Supervisor makes the call with the injured worker or for the injured worker, if needed.
- Nurse assists employee with obtaining appropriate medical treatment, as necessary, schedules clinic visit for employee (calls ahead, and assists with any necessary follow up treatment). The supervisor or SC accompanies the employee if a clinic visit is necessary to ensure that employees receive appropriate and timely care.
- Supervisor or SC completes the HITS entry or Incident Report Form immediately (within 24 hours) and forwards it to the PM and RHSM.
- Nurse notifies appropriate CH2M HILL staff by e-mail (supervisor, Health & Safety, Human Resources, Workers' Compensation).
- Nurse communicates and coordinates with and for employee on treatment through recovery.
- Supervisor ensures suitable duties are identified and available for injured or ill workers who are determined to be medically fit to return to work on transitional duty (temporary and progressive).
- Supervisor ensures medical limitations prescribed (if any) by physician are followed until the worker is released to full duty.

22.6 Serious Incident Reporting Requirements

(Reference CH2M HILL SOP HSE-111, *Incident Reporting, Notification and Investigation*)

The serious incident reporting requirements ensures timely notification and allows for positive control over flow of information so that the incident is handled effectively, efficiently, and in conjunction with appropriate corporate entities. This standard notification process integrates Health, Safety, Security, and Environment and Firm-Wide Security Operations requirements for the consistent reporting of and managing of serious events throughout our operations.

22.6.1 Serious Incident Determination

The following are general criteria for determining whether an incident on CH2M HILL owned or managed facilities or program sites is considered serious and must be immediately reported up to Group President level through the reporting/notification process:

- Work-related death, or life threatening injury or illness of a CH2M HILL employee, subcontractor, or member of the public
- Kidnap or missing person
- Acts or threats of terrorism
- Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than $ 500,000 in damage
- Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community, or the environment

22.6.2 Serious Incident Reporting

If an incident meets the "Serious Incident" criteria, the PM is to immediately contact the Crisis Manager at 720-286-4911, then follow the standard incident reporting procedure.

For all serious incidents this standard reporting process is implemented immediately so as to ultimately achieve notification to the Business Group President within 2 hours of incident onset or discovery, and notification to appropriate corporate Crisis Management Support Team.

Major accidents include any occupational hazard exposure or physical injury that requires more than basic first-aid (physical injury/exposure) or fire, explosion, or property damage exceeding $200,000. Major accidents require immediate notification of appropriate personnel as discussed below and must be done within 24 hours to the Contracting Officer/Representative.

In the event of an injury that constitutes an OSHA-recordable incident, the SSHO will notify the Navy Remedial Project Manager (RPM), Navy Resident Officer in Charge of Construction (ROICC), PM, Compliance Safety and Health Officer, and HSM as soon as practical after the incident. The reporting form shall be Contractor Safety Incident Report, found in **Attachment 13**.

Incident Root Cause Analysis
The accident analysis is essential if all causes of the incident are to be identified for the correct remedial actions to be taken to prevent the same and similar type of incident from recurring. Root Cause Analysis (RCA) shall be completed for all recordable injuries, property damage incidents in excess of $5000.00 (US), environmental permit violations, spills and releases that are required to be reported to regulatory agencies, and any other incident, including near misses where they RHSM or PM determines an RCA is appropriate. The RHSM/ Responsible Environmental Manager is responsible for ensuring it is completed and results entered in the incident report form in HITS. RCA's must be completed using a team that includes, at least the RHSM or designee, the involved party(ies), a responsible operations representative (for example, PM, construction manager, crew supervisor, etc.) and an independent management representative not associated with the incident.

The Root Cause Analysis Form must be completed for all Loss Incidents and Near Loss Incidents. The form must be submitted to the investigation team for review.

For minor losses or near losses, the information may be gathered by the supervisor or other personnel immediately following the loss. Based on the complexity of the situation, the information may be all that is necessary to enable the investigation team to analyze the loss, determine the root cause, and develop recommendations. More complex situations may require the investigation team to revisit the loss site or re-interview key witnesses to obtain answers to questions that may arise during the investigation process.

Photographs or videotapes of the scene and damaged equipment should be taken from all sides and from various distances. The point is especially important when the investigation team will not be able to review the loss scene.

The investigation team must follow the Root Cause Analysis Flow Chart (see Attachment 4 of the SOP) to assist in identifying the root cause(s) of a loss. Any loss may have one or more root causes and contributing factors. The root cause is the primary or immediate cause of the incident, while a contributing factor is a condition or event that contributes to the incident happening, but is not the primary cause of the incident. Root causes and contributing factors that relate to the person involved in the loss, his or her peers, or the supervisor should be referred to as "personal factors." Causes that pertain to the system within which the loss or injury occurred should be referred to as "job factors."

Personal factors include the following:

- Lack of skill or knowledge
- Correct way takes more time and/or requires more effort
- Short-cutting standard procedures is positively reinforced or tolerated
- Person thinks there is no personal benefit to always doing the job according to standards

Job Factors include the following:

- Lack of or inadequate operational procedures or work standards
- Inadequate communication of expectations regarding procedures or standards
- Inadequate tools or equipment

The root cause(s) could be any one or a combination of these seven possibilities or some other uncontrollable factor. In the vast majority of losses, the root cause is very much related to one or more of these seven factors. Uncontrollable factors should be used rarely and only after a thorough review eliminates all seven other factors.

22.6.3 Corrective Actions

Include all corrective actions taken or those that should be taken to prevent recurrence of the incident. Include the specific actions to be taken, the employer and personnel responsible for implementing the actions, and a timeframe for completion. Be sure the corrective actions address the causes.

Once the investigation report has been completed, the PM shall hold a review meeting to discuss the incident and provide recommendations. The responsible supervisors shall be assigned to carry out the recommendations, and shall inform the SSHO upon successful implementation of all recommended actions.

- Evaluation and follow-up of the IRF will be completed by the type of incident by the RHSM or EM.
- Incident investigations must be initiated and completed as soon as possible but no later than 72 hours after the incident.

This page intentionally left blank.

ESBG US Operations
Incident Reporting Flow Diagram

Direct Reporting Responsibility → **Informational Reporting** →

Incident:

- Injury or illness
- Hazardous substance exposure
- Damage to property
- Fire or explosion
- Spill, release, potential violation, or permit exceedance
- A "near-miss"

If incident is an **injury** to US or Puerto Rico based CH2M HILL personnel contact the Occupational Health Nurse at 866/893-2514. Outside the US, the supervisor must notify the HR representative.

The Ops Leader is responsible for completing the Incident Report Form (IRF) in **HITS** when there is an injury to a CH2M HILL employee. The PM, CM or SC is responsible for completing the IRF for all other incidents. ***The IRF/HITS must be completed within 24 hours of the incident and does not replace the required immediate PM and RHSM notifications.***

Incident

Ensure that Emergency Responders have been notified as necessary

Employee or Subcontractor

Provide immediate notification.

Supervisor – Construction Manager - Safety Coordinator

Provide immediate notification by phone and email to PM and RHSM. In addition, for spills, NOVs, and permit issues you may also call the EM.

CRISIS MANAGER:

If the incident meets the "**Serious Incident**" criteria, contact the Crisis Manager **(720.286.4911)**

Third Party

Incidents outside of our contractual obligations do not need to be communicated, unless they are serious and/or may affect CH2M HILL. The RHSM will determine the level of communication necessary for third party incidents.

Serious Incident:

- Work related death, or life threatening injury or illness of a CH2M HILL employee, subcontractor, or member of the public
- Kidnap/missing person
- Acts or threats of terrorism
- Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than $ 500,000 US in damage.
- Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community or the environment.

Responsible HSM (RHSM)

Immediately notify the Sector OR Client Program HSE Manager, immediately notify the Responsible Environmental Manager (EM) for spills, NOVs, and permit issues, and direct the incident investigation.

Client Program HSE Manager

Notify Sector HSM, and coordinate communication and incident investigations.

Immediate notification to the Sector HSM is not required for some minor incidents. Follow the program or sector protocol.

Project Manager

Provide notification to the Sector OR Program Project Delivery (PD) or Operations (Ops) Manager or designee. Notification is based on program or sector specific criteria.

Immediate notification to the PD/Ops Manager is not required for some minor incidents. Follow the program or sector protocol.

Sector or Program PD/Ops Manager

Notify Client Program Manager OR Sector Director, provide guidance and follow the incident through to resolution.

Client Program Manager

Notify Sector Director; provide decision-making assistance or direction for incident resolution.

Keep unnecessary communication of serious incidents to a minimum.

Sector HSE Manager

Coordinate communication, direct significant incident investigations, notify Sector EM for spills, NOVs, & permit issues.

HSSE Director

Provide decision-making assistance or direction for incident resolution.

Sector Director

Provide decision-making assistance or direction for incident resolution.

ES US Operations Director/ Executive Leadership Team

Provide decision-making assistance, direction for incident resolution, and make higher level notifications as necessary

Post-emergency incident communications regarding serious incidents at a CH2M HILL office or project (regardless of the party involved) shall be considered sensitive in nature and must be controlled in a confidential manner.

SECTION 23

Records and Reports

An organized project filing system is essential for good documentation and recordkeeping. The following are some of the many benefits to an organized filing system:

- Other CH2M HILL employees can easily and quickly find documents
- Records are readily available for review
- Records may be needed during OSHA investigations, audits, or other legal matters
- Records may be needed on short notice in case of an accident, illness, or other emergency
- Systematic recordkeeping aids in overall project organization

The project filing system shall be established at the beginning of the project and maintained throughout all phases of construction and archived in accordance with CH2M HILL's Records Retention Policy. The information contained in the filing system shall be updated regularly and/or as specified in this document. The PM and SC are responsible for collecting documentation, including subcontractor documentation, and maintaining a complete and organized filing system.

Below are examples of records that must be maintained as the project progresses:

- Exposure records includes air monitoring data (including calibration records), MSDSs, and exposure modeling results
- Physical hazard exposure records include noise, ionizing radiation, non-ionizing radiation, vibration, and lasers exposure assessments and measurements
- Respiratory fit test records
- Training records
- Incident reports, investigations and associated back-up information such as agency notifications, calculations, and corrective actions taken
- Federal or state agency inspection records
- Other Records:
  - Ergonomic evaluations
  - HSE audits and assessments
  - Project-specific HSE plans
  - Confined space entry permits
  - Equipment inspections
  - Equipment maintenance
  - Emergency equipment inspection records
  - SBOs
  - Self-assessment checklists
- The RHSM shall coordinate with the PM or designee to ensure that final project-specific HSE records described in this section, including negative exposure determinations, are maintained with the project files in accordance with the CH2M HILL records retention schedule, or forwarded to the Medical Surveillance Program Administrator, as appropriate. Records retention requirements are detailed in the Recordkeeping and Access to Records SOP, HSE-119.

CH2M HILL Health and Safety Plan

Attachment 1

Health and Safety Plan Employee Sign-off Form

CH2MHILL

EMPLOYEE SIGNOFF FORM
Health and Safety Plan

The CH2M HILL project employees and subcontractors listed below have been provided with a copy of this SSHP, have read and understood it, and agree to abide by its provisions.

Project Name: **Project Number:**

EMPLOYEE NAME (Please print)	EMPLOYEE SIGNATURE	COMPANY	DATE

CH2M HILL Health and Safety Plan

Attachment 2

Chemical Inventory/Register Form

CH2MHILL

CHEMICAL INVENTORY/REGISTER FORM

Refer to SOP HSE-107, Attachment 1, for instructions on completing this form.

Location:

HCC: ☐ Office ☐ Warehouse ☐ Laboratory ☐ Project:

Project No.:

Regulated Product	Location	Container labeled (✓if yes)	MSDS available (✓if yes)

MSDS for the listed products will be maintained at:

CH2M HILL Health and Safety Plan

Attachment 3

Chemical-Specific Training Form

CH2MHILL

CHEMICAL-SPECIFIC TRAINING FORM

Refer to SOP HSE-107 Attachment 1 for instructions on completing this form.

Location:	**Project #:**
HCC:	**Trainer:**

TRAINING PARTICIPANTS:

Name	Signature	Name	Signature

REGULATED PRODUCTS/TASKS COVERED BY THIS TRAINING:

The HCC shall use the product MSDS to provide the following information concerning each of the products listed above.

- ☐ Physical and health hazards
- ☐ Control measures that can be used to provide protection (including appropriate work practices, emergency procedures, and personal protective equipment to be used)
- ☐ Methods and observations used to detect the presence or release of the regulated product in the workplace (including periodic monitoring, continuous monitoring devices, visual appearance or odor of regulated product when being released, etc.)

Training participants shall have the opportunity to ask questions concerning these products and, upon completion of this training, will understand the product hazards and appropriate control measures available for their protection.

Copies of MSDSs, chemical inventories, and CH2M HILL's written hazard communication program shall be made available for employee review in the facility/project hazard communication file.

CH2M HILL Health and Safety Plan

Attachment 4

Project Activity Self-Assessment Checklists/Permits/Forms

Heat stress physiological monitoring form
Biological
Drilling
PPE

CH2MHILL

HEAT STRESS PHYSIOLOGICAL MONITORING FORM

Project:

Date:

Company:

1. Take and record measurement of temperature or pulse at the frequency indicated in the safety plan.
2. Follow the Physiological Monitoring Protocol in the safety plan.
3. Never continue work if your body temperature is more than 100.4° F/38° C, or if you are experiencing sudden and severe fatigue, nausea, dizziness, or lightheadedness.

Employee:

Describe action taken below if measurements are exceeded:

Time								
Temp								
Pulse								

Employee:

Describe action taken below if measurements are exceeded:

Time								
Temp								
Pulse								

Employee:

Describe action taken below if measurements are exceeded:

Time								
Temp								
Pulse								

Employee:

Describe action taken below if measurements are exceeded:

Time								
Temp								
Pulse								

HS&E Self-Assessment Checklist—Biological Prevention Measures

CH2MHILL

HS&E Self-Assessment Checklist

This checklist shall be used by Navy CLEAN personnel and shall be completed by each crew entering the work area at the frequency of one per day or otherwise specified in the project's Health and Safety Plan/Field Safety Instruction (HSP/FSI). The checklist should be completed prior to entry and at the end of the day to document that appropriate checks have been completed.

This checklist is to be used at locations where the possibility exists that contact with biological hazards is possible.

Site Safety Coordinator (SSC) will request any CH2M HILL subcontractor to take necessary precautions in eliminating the exposure to biological hazards, but shall not direct the means and methods.

Project Name: _____ Project No.: _____
Location: _____ PM: _____
Auditor: _____ Title: _____ Date: _____

- Check "Yes" if an assessment item is complete or correct.
- Check "No" if an item is incomplete or deficient. Section 2 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

SECTION 1 – PRE-ENTRY	Yes	No	N/A	N/O
SITE HAZARD EVALUATION				
1. Inform field members of hazards (types, symptoms)	☐	☐	☐	☐
2. Can work be completed without entering the work zone	☐	☐	☐	☐
3. Have controls been implemented where possible (clearing vegetation, spraying)	☐	☐	☐	☐
4. Has an inspection been made to identify nests, hives or areas where insects may concentrate	☐	☐	☐	☐
5. Will working at different time will reduce exposure	☐	☐	☐	☐
SENSATIVITIES				
6. Does any staff have existing reactions to stings or bites	☐	☐	☐	☐
7. If yes to #6, is special required and medication available on site (epi-pen)	☐	☐	☐	☐
8. Has anyone with an existing condition briefed other team members about symptoms and first aid which may be required	☐	☐	☐	☐
EMERGENCY RESPONSE				
9. Are first aid kits, along with tick removal kits, readily available to all staff	☐	☐	☐	☐
10. Does each member of the field staff have ability to communicate (phone, radios, and visual)	☐	☐	☐	☐
11. Are emergency contacts available (base emergency, local police, or local EMT	☐	☐	☐	☐
12. If working in remote areas, is transport readily available (less than 5 minutes)	☐	☐	☐	☐
13. Have you planned an emergency exit from the site in the event of a swarm	☐	☐	☐	☐

SECTION 2 - PPE	Yes	No	N/A	N/O
SELECTION OF PPE				
14. Will weather (heat, rain, ice) impact the safety of workers wearing protective suits	☐	☐	☐	☐
15. Will visibility be limited to unacceptable levels if a hood is worn	☐	☐	☐	☐
16. Will the use of equipment be difficult if a suit is worn	☐	☐	☐	☐
17. Will heavy vegetation be encountered that could rip or damage a suit	☐	☐	☐	☐
18. Will a Bug-Out suit or Tyvek suit be used by staff (if not, please give additional rationale in writing in Section 4)	☐	☐	☐	☐
TYPE OF PPE USED OTHER THAN BUG-OUT OR TYVEK SUIT				
19. Is staff wearing light-colored clothes	☐	☐	☐	☐
20. Is staff wearing long sleeve shirts	☐	☐	☐	☐
21. Are pant legs tucked into socks	☐	☐	☐	☐
22. Are shirts tucked into pants	☐	☐	☐	☐
23. Has tape been placed around sock/pant leg line and around waist	☐	☐	☐	☐
24. Have hand and wrist areas been sealed	☐	☐	☐	☐
25. Are hats being worn	☐	☐	☐	☐
26. Have clothes been pre treated with Permethrin	☐	☐	☐	☐
27. Has team member inspected coworker's suits or clothing to ensure no spaces exist for insects to penetrate	☐	☐	☐	☐

SECTION 3 – CHECKS AND DECONTAMINATION	Yes	No	N/A	N/O
DAILY CHECKS (TO BE COMPLETED DURING AND AT END OF DAY)				
28. Were tick/insect checks performed during the day (if not, please provide reason in Section 4)	☐	☐	☐	☐
29. Was one unclothed tick check completed	☐	☐	☐	☐
30. Were ticks found on the outerwear (if yes, please note the number in Section 4)	☐	☐	☐	☐
31. Were ticks found inside the Bug-Out, Tyvek, or personal clothing	☐	☐	☐	☐
32. Were suits turned inside out and inspected prior to putting away	☐	☐	☐	☐
33. Were showers taken by field staff immediately upon arrive from the field	☐	☐	☐	☐
34. Were clothing placed in a garbage bag and sealed to prevent any insects from spreading	☐	☐	☐	☐
35. If ticks were found embedding in skin, were they properly removed and saved	☐	☐	☐	☐
36. Have vehicles been inspected for ticks on a daily basis and before the vehicle is turned in	☐	☐	☐	☐
REPORTING				
37. If a tick was found on your skin, could you tell where it entered so that it could be addressed	☐	☐	☐	☐
38. If a tick was found embedded, did you contact the PM, complete a HITS form and contact the Occupational Physician at 1-866-893-2514	☐	☐	☐	☐
39. Did you contact field staff on the project to provide potential corrective measures	☐	☐	☐	☐
40. Did you follow the IM/RTW procedure to ensure you received the proper medical attention (if not, provide an explanation in Section 4)	☐	☐	☐	☐

<u>SECTION 4</u>

Complete this section for all items where further information was requested in the previous sections.

Item #	Rationale	Corrected (either next day or intended on future projects)

Auditor: ________________________________ Project Manager: _____________________________

Attachment 2: HSE Self-Assessment Checklist - Drilling

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's written safety plan.

This checklist is to be used at locations where: 1) CH2M HILL employees are potentially exposed to drilling hazards, 2) CH2M HILL staff are providing support function related to drilling activities, and/or 3) CH2M HILL oversight of a drilling subcontractor is required.

Safety Coordinator may consult with drilling subcontractors when completing this checklist, but shall not direct the means and methods of drilling operations nor direct the details of corrective actions. Drilling subcontractors shall determine how to correct deficiencies and we must carefully rely on their expertise. Items considered being imminently dangerous (possibility of serious injury or death) shall be corrected immediately, or all exposed personnel shall be removed from the hazard until corrected.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

☐ Evaluate CH2M HILL employee exposures to drilling hazards (complete Section 1).
☐ Evaluate CH2M HILL support functions related to drilling activities (complete Section 2)
☐ Evaluate a CH2M HILL subcontractor's compliance with drilling safety requirements (complete entire checklist).
Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the drilling subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in SOP HSE-204.

SECTION 1 - SAFE WORK PRACTICES - 5.1

		Yes	No	N/A	N/O
1.	Personnel cleared during rig start-up, positioning and setup	☐	☐	☐	☐
2.	Personnel clear of rotating parts	☐	☐	☐	☐
3.	Personnel not positioned under hoisted loads	☐	☐	☐	☐
4.	Loose clothing and jewelry removed	☐	☐	☐	☐
5.	Smoking is prohibited around drilling operation	☐	☐	☐	☐
6.	Personnel wearing appropriate personal protective equipment (PPE), per HSP or FSI	☐	☐	☐	☐
7.	Personnel instructed not to approach equipment that has become electrically energized	☐	☐	☐	☐

SECTION 2 - SUPPORT FUNCTIONS - 5.2

AQUIFER DESIGNATIONS (5.2.1)

8.	Aquifer designations determined and BGEM consulted when required.	☐	☐	☐	☐

LOCATION OF UTILITIES (5.2.2)

9.	Location of underground and overhead utilities and structures identified	☐	☐	☐	☐
10.	Utility company contacted to de-energize/ground power lines due to clearance	☐	☐	☐	☐

SUPPORRT FUNCTIONS – 5.2 (Continued)

WASTE MANAGEMENT (5.2.3)	**Yes**	**No**	**N/A**	**N/O**
11. Drill cuttings and purge water managed and disposed properly	☐	☐	☐	☐
12. Wastes generated evaluated for proper disposal	☐	☐	☐	☐
13. Appropriate decontamination procedures being followed, per project's written safety plan	☐	☐	☐	☐
DRILLING AT ORDNANCE EXPLOSIVES OR UNEXPLODED ORDNANCE SITES (5.2.4)				
14. MEC plan prepared and approved	☐	☐	☐	☐
15. MEC avoidance provided, routes and boundaries cleared and marked	☐	☐	☐	☐
16. Initial pilot hole established by UXO technician with hand auger	☐	☐	☐	☐
17. Personnel remain inside cleared areas	☐	☐	☐	☐
SECTION 3 - DRILLING SAFETY REQUIREMENTS -5.3				
GENERAL (5.3.1)				
18. Only authorized personnel operating drill rigs	☐	☐	☐	☐
19. Daily safety briefing/meeting conducted with crew	☐	☐	☐	☐
20. Daily inspection of drill rig and equipment conducted before use	☐	☐	☐	☐
21. Good housekeeping maintained on and around rig	☐	☐	☐	☐
SAFETY EQUIPMENT (5.3.2)				
22. Safety-toed boots, hardhats, safety glasses w/side shields, gloves and hearing protection worn	☐	☐	☐	☐
23. Drill rig equipped with fire extinguisher	☐	☐	☐	☐
24. Air monitoring instruments provided when required	☐	☐	☐	☐
25. Reflective/high visibility vests worn when required	☐	☐	☐	☐
26. PPE for protection from chemical hazards worn if required	☐	☐	☐	☐
BURIED UTILITY AND OVERHEAD CLEARANCE (5.3.3)				
27. Location of underground utilities and structures identified, including third party locate	☐	☐	☐	☐
28. 360^0 visual observation conducted	☐	☐	☐	☐
29. Hand digging, air knifing conducted to expose utilities before drilling	☐	☐	☐	☐
30. Safe clearance distance maintained from overhead power lines	☐	☐	☐	☐
31. Power lines de-energized and grounded when safe distances cannot be maintained	☐	☐	☐	☐
DRILL RIG PLACEMENT (5.3.4)				
32. Drilling pad established, when necessary	☐	☐	☐	☐
33. Drill rig leveled and stabilized	☐	☐	☐	☐
34. Additional precautions taken when drilling in restricted areas	☐	☐	☐	☐
35. In Karst topography use remote sensing or geologist review for sinkholes	☐	☐	☐	☐
DRILL RIG TRAVEL (5.3.5)				
36. Rig shut down and mast lowered and secured prior to rig movement	☐	☐	☐	☐
37. Tools and equipment secured prior to rig movement	☐	☐	☐	☐
38. Only personnel seated in cab wearing a seat belt are riding on rig during movement	☐	☐	☐	☐
39. Backup alarm or spotter used when backing rig	☐	☐	☐	☐
40. Spotter used when backing rig in tight or restricted areas or when low clearances exist	☐	☐	☐	☐
41. Safe clearance distance maintained while traveling under overhead power lines	☐	☐	☐	☐
EMERGENCY – CONTACT WITH OVERHEAD OR UNDERGROUND ELECTRICAL LINES (5.3.6)				
42. Personnel understand emergency procedures in the event of contact with overhead or underground electrical lines	☐	☐	☐	☐
DRILL RIG OPERATION (5.3.7)				
43. Drill rig operated in accordance with operators' manual	☐	☐	☐	☐
44. Personnel clear while mast is being raised	☐	☐	☐	☐
45. Kill switch clearly identified, operational, and in reach of the operator control station	☐	☐	☐	☐

SECTION 3 - DRILLING SAFETY REQUIREMENTS - 5.3 (Continued)

46.	All machine guards are in place	☐	☐	☐	☐
47.	Rig ropes never wrapped around any part of the body	☐	☐	☐	☐
48.	Pressurized lines and hoses secured to prevent whipping hazards	☐	☐	☐	☐
49.	Drilling operation stopped during inclement weather	☐	☐	☐	☐
50.	Air monitoring conducted per written safety plan for hazardous atmospheres	☐	☐	☐	☐
51.	Rig gear boxes placed in neutral when operator not at controls	☐	☐	☐	☐
52.	Operator shuts rig engine down prior to leaving the drill rig vicinity	☐	☐	☐	☐
DRILL RIG SITE CLOSURE (5.3.8)					
53.	Ground openings/holes filled or barricaded	☐	☐	☐	☐
54.	Equipment and tools properly stored	☐	☐	☐	☐
55.	All vehicles locked and keys removed	☐	☐	☐	☐
DRILL RIG MAINTENANCE (5.3.9)					
56.	Rig properly maintained per drilling company's maintenance program and records on-site/available for review	☐	☐	☐	☐
57.	Defective components repaired immediately	☐	☐	☐	☐
58.	Lockout/tagout procedures used prior to maintenance	☐	☐	☐	☐
59.	Cathead in clean, sound condition	☐	☐	☐	☐
60.	Drill rig ropes in clean, sound condition	☐	☐	☐	☐
61.	Fall protection used for fall exposures of 6 feet (U.S.) 1.5 m or greater	☐	☐	☐	☐
62.	Rig in neutral and augers stopped rotating before cleaning	☐	☐	☐	☐
63.	Good housekeeping maintained on and around rig	☐	☐	☐	☐
FORMS/PERMITS AND CHECKLISTS (7.0)					
64.	Driller license/certification obtained	☐	☐	☐	☐
65.	Well development/abandonment notifications and logs submitted and in project files	☐	☐	☐	☐
66.	Groundwater withdrawal permit obtained where required	☐	☐	☐	☐
67.	Dig permit obtained where required	☐	☐	☐	☐

SECTION 3

Complete this section for all items checked "No" in previous sections. Deficient items must be corrected in a timely manner.

Item #	Corrective Action Planned/Taken	Date Corrected

Auditor: _____ Project Manager: _____

CH2MHILL

HS&E Self-Assessment Checklist: PPERSONAL PROTECTIVE EQUIPMENT

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI.

This checklist is to be used at locations where CH2M HILL employees are required to wear PPE or are required to perform oversight of a subcontractor using PPE or both.

CH2M HILL staff shall not direct the means and methods of subcontractor use of PPE nor direct the details of corrective actions. The subcontractor must determine how to correct deficiencies and CH2M HILL staff must carefully rely on their expertise. Conditions considered to be imminently dangerous (possibility of serious injury or death) must be corrected immediately or all exposed personnel must be removed from the hazard until corrected.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to (check only one of the boxes below):

☐ Evaluate CH2M HILL compliance with its PPE program (SOP HSE-117)
☐ Evaluate a CH2M HILL subcontractor's compliance with its PPE program
Subcontractor's Name: _____

Check the appropriate box, as follows:

- Check "Yes" if an assessment item is complete or correct.
- Check "No" if an item is incomplete or deficient. Section 2 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HSE-121.

SECTION 1	**Yes**	**No**	**N/A**	**N/O**
GENERAL				
1. Required PPE listed in HSP FSI or AHA.	☐	☐	☐	☐
2. PPE available for use by employees.	☐	☐	☐	☐
3. PPE cleaning supplies available for use.	☐	☐	☐	☐
4. PPE stored appropriately to prevent deformation or distortion.	☐	☐	☐	☐
5. PPE written certification has been completed.	☐	☐	☐	☐
EYEWEAR (Glasses/Goggles/Face Shields)				
6 Eyewear cleaning supplies available.	☐	☐	☐	☐
7 Safety glasses in good condition and lenses free of scratches.	☐	☐	☐	☐
8 Goggles adjustment strap not cracked or frayed, not deformed, or lenses not scratched.	☐	☐	☐	☐
9. Face shields in good condition, including adjustment band, and free of scratches or chips.	☐	☐	☐	☐

CH2MHILL

HS&E Self-Assessment Checklist: PERSONAL PROTECTIVE EQUIPMENT

SECTION 1 (Continued)	Yes	No	N/A	N/O
HEAD PROTECTION				
10. Hard hat bill and suspension attached as allowed by manufacturer.	☐	☐	☐	☐
11. Shell is pliable, free of dents, cracks, nicks, or any damage due to impact.	☐	☐	☐	☐
12. Suspension maintained at 1.25 inches from inside of shell.	☐	☐	☐	☐
13. Suspension free of cuts or fraying, torn headband, adjustment strap workable.	☐	☐	☐	☐
14. Electrical hard hat matched to hazard classification.	☐	☐	☐	☐
15. Dated to determine whether within manufacturer's allowable 5-year use time period.	☐	☐	☐	☐
HAND PROTECTION				
16. Available in sizes matched to employee.	☐	☐	☐	☐
17. Gloves free of rips tears, abrasions, or holes.	☐	☐	☐	☐
18. Matched to manufacturer's specification for chemicals used onsite.	☐	☐	☐	☐
19. Electrical gloves matched to hazard and periodically inspected for insulating rating.	☐	☐	☐	☐
20. Maintained in a clean and sanitary condition, decontaminated or disposed properly.	☐	☐	☐	☐
BODY PROTECTION				
21. Available in sizes matched to employee.	☐	☐	☐	☐
22. Maintained in a clean and sanitary condition, decontaminated or disposed properly.	☐	☐	☐	☐
23. Vapor-tight fully encapsulated suits tested at required periodic intervals.	☐	☐	☐	☐
24. Flame-resistant clothing matched to electrical hazard and arc flash rating.	☐	☐	☐	☐
25 Welding gear matched to degree of hazard and free of cuts, tears or burn holes.	☐	☐	☐	☐
26 Flotation gear available for work near or on water and in good condition.	☐	☐	☐	☐
HOT AND COLD BODY PROTECTION				
27 Cooling gear available based on degree of heat stress hazard.	☐	☐	☐	☐
28 Cooling gear in operable, clean, and sanitary condition.	☐	☐	☐	☐
29 Cold-weather gear provided based on needs assessment.	☐	☐	☐	☐
30. Cold-weather gear available in sizes to match employees.	☐	☐	☐	☐
31 Cold-weather gear is in free of tears, rips, or holes and in maintained in a clean condition.	☐	☐	☐	☐
TRAINING				
32 Initial PPE training completed by employees.	☐	☐	☐	☐
33 Training conducted when new types or styles of PPE are issued.	☐	☐	☐	☐
34 PPE selection, use, and maintenance reviewed at daily safety briefings.	☐	☐	☐	☐

SECTION 2

Complete this section for all items checked "No" in Section 1. Deficient items must be corrected in a timely manner.

Item #	Corrective Action Planned or Taken	Date Corrected

Auditor: _____ Project Manager: _____

CH2M HILL Health and Safety Plan

Attachment 5

Key Target Zero Program Elements

(blank forms for field use)

Activity Hazard Analysis EM 385 format

Pre-Task Safety Plans

Safe Behavior Observation

Incident Report and Investigation
(use electronic form when possible)

HITS

Lessons Learned Template

Activity Hazard Analysis (AHA)

ACTIVITY/WORK TASK:		Overall Risk Assessment Code (RAC) (Use highest code)				
	SIGNATURES	Activity #		AHA #		
PWD/OICC/ROICC OFFICE		Risk Assessment Code (RAC) Matrix				
NAME & DATE ACCEPTED BY GDA:						
CONTRACT NUMBER:		Severity	Probability			
TASK ORDER/DELIVERY #:						
PRIME CONTRACTOR:			Frequent	Likely	Occasional	Seldom	Unlikely
SUBCONTRACTOR:							
DATE OF PREPARATORY MEETING:		Catastrophic	E	E	H	H	M
DATE OF INITIAL INSPECTION:		Critical	E	H	H	M	L
CONTRACTOR COMPETENT PERSON:		Marginal	H	M	M	L	L
SITE SAFETY and HEALTH OFFICER		Negligible	M	L	L	L	L
ACCEPTANCE BY GOVERNMENT DESIGNATED AUTHORITY (GDA)		Review each "**Hazard**" with identified safety "**Controls**" and determine (RAC)					
E = EXTREMELY HIGH (PWO/OICC/ROICC)		Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" .Place the highest RAC at the top of AHA. This is the overall risk assessment code for this activity					
H = HIGH RISK (FEAD DIRECTOR)		"**Severity**" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible after controls are in place					
M = MODERATE RISK (CM or ET or PAR)							
L = LOW RISK (ET or PAR)		"**Probability**" is the likelihood to cause an incident, near miss, or accident did occur and identified as: Frequent, Likely, Occasional, Seldom, or Unlikely after controls are put in place.					

Job Steps	Hazards	Controls	RAC

Job Steps	Hazards	Controls	RAC

Equipment to be Used	Training Requirements and Competent or Qualified Personnel name(s)	Inspection Requirements	RAC

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements

Instructions for completing Contractor Activity Hazard Analysis

1. Activity/Work Task – Insert work/task this AHA is written for that is excavation, scaffold building, foundation preparation.
2. PWO/OICC/ROICC – Insert name of Public Works Office, Officer In Charge of Construction Office or
   Resident Officer in Charge of Construction (PWD/OICC/ROICC
3. Enter name & date AHA accepted by Government Designated Authority (GDA)
4. Enter contract number
5. Enter Task order or Delivery order number
6. Enter Prime Contractors name
7. Enter Subcontractors name
8. Enter date preparatory meeting was held
9. Enter date initial inspection was performed
10. Enter name of contractor competent person onsite for this activity
11. Enter name of Prime Contractor Site Safety and Health Officer
12. Level of government person responsible for accepting the AHA, progressive signatures as level of risk increases.
13. Overall Risk Assessment code is highest code assigned to any Job step after Hazards are assessed and Controls have been assigned
14. Schedule number is activity number from production daily reports
15. AHA number is the sequential number of all AHA's for this contract.
16. Job steps is the complete sequence of work, not general statements to complete the entire activity
17. Hazards is the known safety risks associated with completing the task
18. Controls is the safety measures in place to reduce the hazard to the lowest level possible
19. Risk Assessment code is where Severity and Probability intersect, place that letter E, H, M, or L in the RAC column
20. List all equipment to be used to complete this activity that is crane, backhoe, vehicle, all heavy equipment
21. List the training requirements required by EM 385, Safety Spec 01356 or OSHA that apply to this task.
    List competent person(s) required for specific tasks in EM 385
    List qualified person(s) required for specific tasks in EM 385
    List CPR/First Aid training and qualification dates
22. List all inspection requirements of EM 385, Governmental Safety Requirements Specifications or OSHA 29 CFR 1926

CH2MHILL

PRE-TASK SAFETY PLAN (PTSP) AND SAFETY MEETING SIGN-IN SHEET

Project: _____ Location: _____ Date: _____

Supervisor: _____ ob Activity: _____

_____

Attendees	Print Name	Sign Name

List Tasks and verify that applicable AHAs have been reviewed:

_____

_____

Tools/Equipment Required for Tasks (ladders, scaffolds, fall protection, cranes/rigging, heavy equipment, power tools):

_____

_____

Potential H&S Hazards, including chemical, physical, safety, biological and environmental (check all that apply):

__ Chemical burns/contact	__ Trench, excavations, cave-ins	__ Ergonomics
__ Pressurized lines/equipment	__ Overexertion	__ Chemical splash
__ Thermal burns	__ Pinch points	__ Poisonous plants/insects
__ Electrical	__ Cuts/abrasions	__ Eye hazards/flying projectile
__ Weather conditions	__ Spills	__ Inhalation hazard
__ Heights/fall > 6 feet	__ Overhead Electrical hazards	__ Heat/cold stress
__ Noise	__ Elevated loads	__ Water/drowning hazard
__ Explosion/fire	__ Slips, trip and falls	__ Heavy equipment
__ Radiation	__ Manual lifting	__ Aerial lifts/platforms
__ Confined space entry	__ Welding/cutting	__ Demolition
__Underground Utilities	__ Security	__ Poor communications

Other Potential Hazards (Describe):

_____

_____

_____

Hazard Control Measures (Check All That Apply):			
PPE __ Thermal/lined __ Eye __ Dermal/hand __ Hearing __ Respiratory __ Reflective vests __ Flotation device __ Hard Hat	Protective Systems __ Sloping __ Shoring __ Trench box __ Barricades __ Competent person __ Locate buried utilities __ Daily inspections __ Entry Permits/notification	Fire Protection __ Fire extinguishers __ Fire watch __ Non-spark tools __ Grounding/bonding __ Intrinsically safe equipment	Electrical __ Lockout/tagout __ Grounded __ Panels covered __ GFCI/extension cords __ Power tools/cord inspected __ Overhead line clearance __ Underground utils ID'd
Fall Protection __ Harness/lanyards __ Adequate anchorage __ Guardrail system __ Covered opening __ Fixed barricades __ Warning system	Air Monitoring __ PID/FID __ Detector tubes __ Radiation __ Personnel sampling __ LEL/O2 __ No visible dust __ Other	Proper Equipment __ Aerial lift/ladders/ scaffolds __ Forklift/heavy equipment __ Backup alarms __ Hand/power tools __ Crane with current inspection __ Proper rigging __ Operator qualified	Welding & Cutting __ Cylinders secured/capped __ Cylinders separated/upright __ Flash-back arrestors __ No cylinders in CSE __ Flame retardant clothing __ Appropriate goggles
Confined Space Entry __ Isolation __ Air monitoring __ Trained personnel __ Permit completed __ Rescue	Medical/ER __ First-aid kit __ Eye wash __ FA-CPR trained personnel __ Route to hospital	Heat/Cold Stress __ Work/rest regime __ Rest area __ Liquids available __ Monitoring __ Training	Vehicle/Traffic __ Traffic control __ Barricades __ Flags __ Signs
Permits __ Hot work __ Confined space __ Lockout/tagout __ Excavation __ Demolition __ Energized work	Demolition __ Pre-demolition survey __ Structure condition __ Isolate area/utilities __ Competent person __ Hazmat present	Inspections: __ Ladders/aerial lifts __ Lanyards/harness __ Scaffolds __ Heavy equipment __ Drill rigs/geoprobe rigs __ Cranes and rigging __ Utilities marked	Training: __ Hazwaste (current) __ Construction __ Competent person __ Task-specific __ FA/CPR __ Confined Space __ Hazcom
Underground Utilities __Dig alert called __3rd Party locater __As-builts reviewed __Interview site staff __Client review __soft locate necessary?	Incident Communications __Work stops until cleared by TM/CM __Immediate calls to TM/CM __Client notification __24 hour notification setup __Clear communications	AHA's __reviewed and approved by HSM __on site and current __applicable for this day's work __Communication and incident processes included?	
Field Notes (including observations from prior day, etc.): _ _____ _____			

Name (Print): _____ Signature: _____ Date: _____

CH2MHILL

SAFE BEHAVIOR OBSERVATION FORM

☐ Federal or ☐ Commercial Sector (check one) ☐ International	☐ Construction or ☐ Consulting (check one)	
Project Number:	Client/Program:	
Project Name:	Observer:	Date:
Position/Title of worker observed:	Background Information/ comments:	
Task/Observation Observed:		

- ❖ Identify and reinforce safe work practices/behaviors
- ❖ Identify and improve on at-risk practices/acts
- ❖ Identify and improve on practices, conditions, controls, and compliance that eliminate or reduce hazards
- ❖ Proactive PM support facilitates eliminating/reducing hazards (do you have what you need?)
- ❖ Positive, corrective, cooperative, collaborative feedback/recommendations

Actions & Behaviors	Safe	At-Risk	Observations/Comments
Current & accurate Pre-Task Planning/Briefing (Project safety plan, STAC, AHA, PTSP, tailgate briefing, etc., as needed)			**Positive Observations/Safe Work Practices:**
Properly trained/qualified/experienced			
Tools/equipment available and adequate			
Proper use of tools			**Questionable Activity/Unsafe Condition Observed:**
Barricades/work zone control			
Housekeeping			
Communication			
Work Approach/Habits			
Attitude			
Focus/attentiveness			**Observer's Corrective Actions/Comments:**
Pace			
Uncomfortable/unsafe position			
Inconvenient/unsafe location			
Position/Line of fire			
Apparel (hair, loose clothing, jewelry)			
Repetitive motion			**Observed Worker's Corrective Actions/Comments:**
Other...			

For ES Federal Sector projects please email completed forms to: CH2M HILL ES FED Safe Behavior Observation
For ES Commercial Sector projects please email completed forms to: CH2M HILL ES COM Safe Behavior Observation
For CNR ES staff please email completed forms to: cnressafe@ch2m.com
For International ES projects please e-mail completed forms to: ESINTLSafeBehaviorObservation@ch2m.com

HITS Incident Report Hardcopy (Phase 1 – Initial Entry)

Phase 1 – Initial Entry

Type of Incident (May select more than one)

- ☐ Injury/Illness
- ☐ Property Damage
- ☐ Spill/Release
- ☐ Environment/Permit
- ☐ Near Miss
- ☐ Other

General Information Section

Preparer's Name: _____ Preparer's Phone Number:

Date of Incident: _____ Time of Incident: _____ AM/PM

What Business Group is accountable for this incident:

What Business Group SubGroup is accountable for this incident:

What CH2M HILL Company is accountable for this incident:

Where did the Incident occur?

- ☐ United States, Geographic Region: _____
- ☐ Canada, Province/Territory: _____
- ☐ International, County: _____

Location of Incident?

- ☐ Company Premises, CH2M HILL Office (use 3 letter office code if available):
- ☐ Project, Project name:
- ☐ In Transit
  Traveling from:
  Traveling to:
- ☐ At Home
- ☐ Other, Specify:

Describe the incident:

Describe how this event could have been prevented:

Provide Witness Information:

Name: _____ Phone:

Name: _____ Phone:

Name: _____ Phone:

Personnel Notified of Incident (Provide name, date and time):

CH2M HILL Personnel:

Client Personnel:

Additional Comments:

Injury/Illness Section [Complete only if Injury/Illness Incident type selected]

Who was injured?

- ☐ CH2M HILL Employee or CH2M HILL Temp Employee
- ☐ Subcontractor to CH2M HILL (Non-LLC Joint Venture Project)
- ☐ LLC Joint Venture Partner Employee
- ☐ LLC Joint Venture Project Subcontractor/Contractor
- ☐ Other

Name of Injured: _____ Job Title: _____

Employer Name: _____ Supervisor of Employee: _____

Complete for CH2M HILL Employee Injuries

Business Group of Injured Employee: _____

Has the employee called the Injury Management Administrator (1-866-893-2514)?

☐ Yes ☐ No ☐ Not Sure

Has the injured employee's supervisor been notified of this incident?

☐ Yes ☐ No ☐ Not Sure

Complete for Non-CH2M HILL Employee Injuries

Has the project safety coordinator been notified of this incident?

☐ Yes ☐ No ☐ Not Sure

Project Safety Coordinator: _____

Body Part Affected: _____

Injury/Illness (Result): _____

Describe treatment provided (if medication provided, identify whether over-the-counter or prescription): _____

Describe any work restriction prescribed (include dates and number of days): _____

Physician/Health Care Provider Information

Name: _____ Phone: _____

Was treatment provided away from the worksite?

- ☐ No
- ☐ Yes

Facility Name: _____

Address: _____

City: _____ Phone Number: _____

Was injured treated in an emergency room?

☐ No ☐ Yes

Was injured hospitalized overnight as an in-patient?

☐ No ☐ Yes

General Information Environmental Section [Complete only if Environment/Permit or Spill/Release Incident type selected]

Who had control of the area during the incident?

☐ CH2M HILL, Company:

☐ Subcontractor, Company:

☐ Joint Venture Partner/Contractor/Subcontractor, Company:

☐ Other, Company:

Relationship to CH2M HILL:

Property Damage Section [Complete only if Property Damage Incident type selected]

Property Damaged:

Property Owner:

Damage Description:

Estimated US Dollar Amount:

Spill or Release Section [Complete only if Spill/Release Incident type selected]

Substance:

Estimated Quantity:

Did the spill/release move off the property?:

Spill/Release From:

Spill/Release To:

Environment/Permit Section [Complete only if Environment/Permit Incident type selected]

Describe Environmental or Permit Issue:

Permit Type:

Permitted Level or Criteria (e.g., discharge limit):

Permit Name and Number (e.g., NPDES No. ST1234):

Substance and Estimated Quantity:

Duration of Permit Exceedence:

HSSE

Lessons Learned

[Date] ESBG LL-11-xx

Subject	**[Insert Descriptive Name of Lessons Learned]**
CH2M HILL Project?	[Yes or No]
Situation	[Describe incident or situation that occurred in general terms. Try to be brief and avoid unnecessary details such as names of people or projects, business groups, divisions, dates, location, etc.]
Lessons Learned (Recommendations and Comments)	• Bullet out any lessons learned, recommendations or other important "take away" information that would benefit others. Tie the recommendations to the incident or event, and avoid including information that is not directly tied to the event.
Submitted By	[Name/Office Location/Phone]
Additional Information Contact	[Name/Office Location/Phone]
Keywords/Categories	[Insert any keywords or incident categories that would aid in a search for this lessons learned]

Send completed Lessons Learned to the ESBG HSSE Director for posting and distribution. Please include a recommended distribution list.

CH2M HILL Health and Safety Plan

Attachment 6

Fact Sheets

Tick Fact Sheet

Vehicle Accident Guidance

Working Alone

TICK-BORNE PATHOGENS — A FACT SHEET

Most of us have heard of Lyme disease or Rocky Mountain Spotted Fever (RMSF), but there are actually six notifiable tick-borne pathogens that present a significant field hazard. In some areas, these account for more than half of our serious field incidents. The following procedures should be applied during any field activity—even in places that are predominantly paved with bordering vegetation.

Hazard Recognition

An important step in controlling tick related hazards is understanding how to identify ticks, their habitats, their geographical locations, and signs and symptoms of tick-borne illnesses.

Tick Identification

There are five varieties of hard-bodied ticks that have been associated with tick-borne pathogens. These include:

- Deer (Black Legged) Tick (eastern and pacific varieties)
- Lone Star Tick
- Dog Tick
- Rocky Mountain Wood Tick

These varieties and their geographical locations are illustrated on the following page.

Tick Habitat

In eastern states, ticks are associated with deciduous forest and habitat containing leaf litter. Leaf litter provides a moist cover from wind, snow, and other elements. In the north-central states, is generally found in heavily wooded areas often surrounded by broad tracts of land cleared for agriculture.

On the Pacific Coast, the bacteria are transmitted to humans by the western black-legged (deer) tick and habitats are more diverse. For this region, ticks have been found in habitats with forest, north coastal scrub, high brush, and open grasslands. Coastal tick populations thrive in areas of high rainfall, but ticks are also found at inland locations.

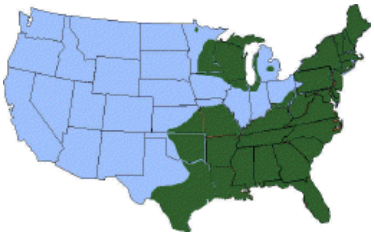
Illnesses and Signs & Symptoms

There are six notifiable tick-borne pathogens that cause human illness in the United States. These pathogens may be transmitted during a tick bite—normally hours after attachment. The illnesses, presented in approximate order of most common to least, include:

- Lyme (bacteria)
- RMSF (bacteria)
- Ehrlichiosis (bacteria)
- STARI (Southern Tick-Associated Rash Illness) (bacteria)
- Tularemia (Rabbit Fever) (bacteria)
- Babesia (protozoan parasite)

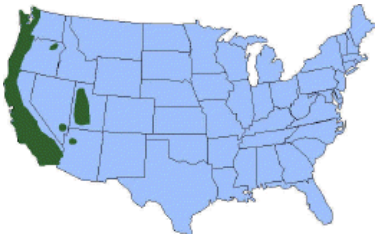
Symptoms will vary based on the illness, and may develop in infected individuals typically between 3 and 30 days after transmission. Some infected individuals will not become ill or may develop only mild symptoms. These illnesses present with some or all of the following signs & symptoms: fever, headache, muscle aches, stiff neck, joint aches, nausea, vomiting, abdominal pain, diarrhea, malaise, weakness, small solid, ring-like, or spotted rashes. The bite site may be red, swollen, or develop ulceration or lesions. For Lyme disease, the bite area will sometimes resemble a target pattern. A variety of long-term symptoms may result if the illness is left untreated, including debilitating effects and death.

Deer Tick



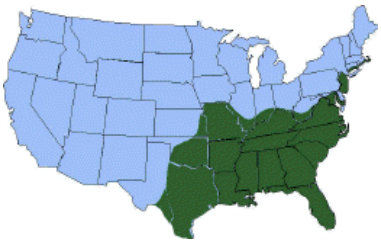
Distribution of Deer Tick (dark green)

From Left: adult female, adult male, nymph, and larvae Deer Tick (centimeter scale)

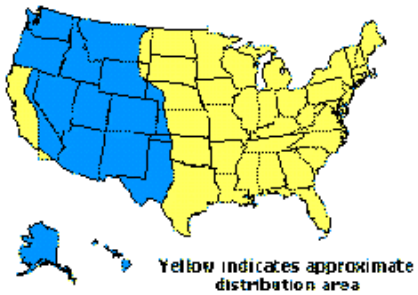


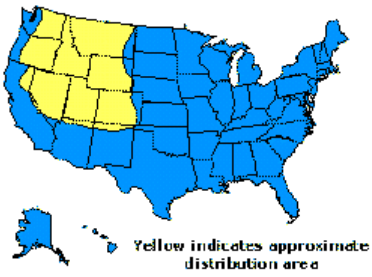
Distribution of Lone Star Tick (Green)

Lone Star Tick



Dog Tick





Rocky Mountain Wood Tick

Hazard Control

The methods for controlling exposure to ticks include, in order of most- to least-preferred:

- Avoiding tick habitats and ceasing operations in heavily infested areas
- Reducing tick abundance through habitat disruption or application of acracide
- Personal protection through use of repellants and protective clothing
- Frequent tick inspections and proper hygiene

Vaccinations are not available and preventative antibiotic treatment after a bite is generally not recommended.

Avoidance and Reduction of Ticks

To the extent practical, tick habitats should be avoided. In areas with significant tick infestation, consider stopping work and withdrawing from area until adequate tick population control can be achieved. Stopping and withdrawing should be considered as seriously as entering an area without proper energy control or with elevated airborne contaminants—tick-borne pathogens present risk of serious illness!

In areas where significant population density or infestation exists, tick reduction should be considered. Tick reduction can be achieved by disrupting tick habitats and/or direct population reduction through the use of tick-toxic pesticides (Damminix, Dursban, Sevin, etc.).

Habitat disruption may include only simple vegetative maintenance such as removing leaf litter and trimming grass and brush. Tick populations can be reduced by between 72 and 100 percent when leaf litter alone is removed. In more heavily infested areas, habitat disruption may include grubbing, tree trimming or removal, and pesticide application (Damminix, Dursban, Sevin, etc.). This approach is practical in smaller, localized areas or perimeter areas that require occasional access. Habitat controls are to be implemented with appropriate health and safety controls, in compliance with applicable environmental requirements, and may be best left to the property owner or tenant or to a licensed pesticide vendor. Caution should be exercised when using chemical repellents or pesticides in or around areas where environmental or industrial media samples will be collected for analysis.

Personal Protection

After other prevention and controls are implemented, personal protection is still necessary to control exposure to ticks. Personal protection must include all of the following steps:

- So that ticks may be easily seen, wear light-colored clothing. Full-body New Tyvek (paper-like disposable coveralls) may also be used
- To prevent ticks from getting underneath clothing tuck pant legs into socks or tape to boots
- Wear long-sleeved shirts, a hat, and high boots
- Apply DEET repellent to exposed skin or clothing per product label
- Apply permethrin repellent to the outside of boots and clothing before wearing, per product label
- Frequently check for ticks and remove from clothing
- At the end of the day, search your entire body for ticks (particularly groin, armpits, neck, and head) and shower
- To prevent pathogen transmission through mucous membranes or broken/cut skin, wash or disinfect hands and/or wear surgical-style nitrile gloves any time ticks are handled

Pregnant individuals and individuals using prescription medications should consult with their physician and/or pharmacists before using chemical repellents. Because human health effects may not be fully known,

use of chemical repellents should be kept to a minimum frequency and quantity. Always follow manufacturers' use instructions and precautions. Wash hands after handling, applying, or removing protective gear and clothing. Avoid situations such as hand-to-face contact, eating, drinking, and smoking when applying or using repellents.

Remove and wash clothes per repellent product label. Chemical repellents should not be used on infants and children.

Vaccinations are generally not available for tick-borne pathogens. Although production of the LYMErix™ Lyme disease vaccination has been ceased, vaccination may still be considered under specific circumstances and with concurrence from the consulting physician.

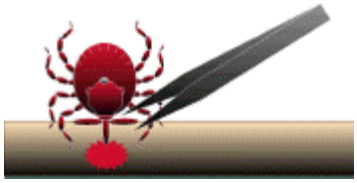
Tick Check

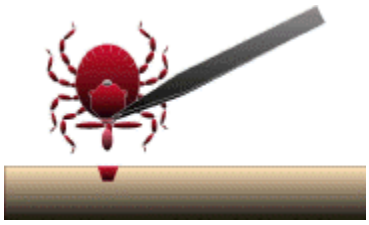
A tick check should be performed after field survey before entering the field vehicle (you do not want to infest your field vehicle with ticks). Have your field partner check your back; the backs of your legs, arms, and neck; and your hairline. Shake off clothing as thorough as possible before entering the vehicle. Once the field day is complete, repeat this procedure and perform a thorough self check.

If a tick has embedded itself into the skin, remove the tick as described below.

Tick Removal

1. Use the tick removal kit obtained through the CH2M HILL Milwaukee warehouse, or a fine-tipped tweezers or shield your fingers with a tissue, paper towel, or nitrile gloves.
2. Grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure. Do not twist or jerk the tick; this may cause the mouthparts to break off and remain in the skin. If this happens, remove mouthparts with tweezers. Consult your healthcare provider if infection occurs.





3. Avoid squeezing, crushing or puncturing the body of the tick because its fluids (saliva, hemolymph, gut contents) may contain infectious organisms. Releasing these organisms to the outside of the tick's body or into the bite area may increase the chance of infectious organism transmission.
4. Do not handle the tick with bare hands because infectious agents may enter through mucous membranes or breaks in the skin. This precaution is particularly directed to individuals who remove ticks from domestic animals with unprotected fingers. Children, elderly persons, and immunocompromised persons may be at greater risk of infection and should avoid this procedure.
5. After removing the tick, thoroughly disinfect the bite site and wash your hands with soap and water.
6. Should you wish to save the tick for identification, place it in a plastic bag, with the date of the tick bite, and place in your freezer. It may be used at a later date to assist a physician with making an accurate diagnosis (if you become ill).

Note: Folklore remedies such as petroleum jelly or hot matches do little to encourage a tick to detach from skin. In fact, they may make matters worse by irritating the tick and stimulating it to release additional saliva, increasing the chances of transmitting the pathogen. These methods of tick removal should be avoided. In addition, a number of tick removal devices have been marketed, but none are better than a plain set of fine tipped tweezers.

First-Aid and Medical Treatment

Tick bites should always be treated with first-aid. Clean and wash hands and disinfect the bite site after removing embedded tick. Individuals previously infected with Lyme disease does not confer immunity—re-infection from future tick bites can occur even after a person has contracted a tick-borne disease.

The employee should contact the Injury Management/Return To Work provider (IMRTW), WorkCare using the toll-free number 866-893-2514 to report the tick bite. WorkCare will follow-up with each CH2M Hill employee who reports a tick bite and is at risk of developing Lyme disease by monitoring for symptoms up to 45 days, and will refer the employee to a medical provider for evaluation and treatment as necessary.

CH2MHILL

2015 Vehicle Accident Guidance—E&N Business Group

Remember that if you a **renting** a non-CH2M HILL owned vehicle (short-term rental) in the U.S., you should carry the insurance card from the state where your driver's license is issued.

If you operate a **fleet vehicle**, carry the insurance card where the vehicle is registered.

For ALL Vehicles if you are in an accident:

1. If you are injured, call 911 for emergency medical treatment or 1-866-893-2514 to contact the CH2M HILL Occupational Nurse/Physician for minor injuries. If you feel you have not been injured, contact the RHSM for guidance on whether calling the CH2M HILL Occupation Nurse/Physician is applicable.

2. **Call the Police--**For any vehicle accident/damage, it is recommended that the local police (or site security/emergency services if working on a client site that provides such services) be called to determine if a report needs to be filed. In some instances, a report may not be required (during accident alerts, or in public parking lots). Document that the authorities were called and follow up with any guidance they give you. State requirements vary. If a report is filed, obtain a copy.

3. Notify Supervisor, (and PM/RHSM if working on a project site)

4. Complete a HITS report on the VO.

Additional Steps

To report an auto accident, and before a claim can be taken by telephonic reporting, have available your name (the company name alone is no longer accepted, a driver's name must be provided even for fender benders), location of accident and your office address if different than the accident location, business group and project number. A claim cannot be taken without your name, address, business group and your project number. By location the state where the accident occurred, and which office you are aligned to, i.e., accident occurs in Idaho, but you are out of the Denver office. Advise the claim recorder the accident occurred in ID, but that your office location is Denver. This will assist the claim intake person in identifying location coding for the claims.

Auto accidents involve two different sections of an Auto policy:

1) Liability to others due to Bodily Injury and Property Damage

2) Physical Damage - Comprehensive and Collision - damage to the vehicle CH employee is driving

CH2M Hill has Liability coverage for any auto - our policy will respond on either a primary or excess basis.

Refer to the table below for additional notifications to make based on the type of accident experienced and vehicle being used.

Liability - Bodily Injury or Property Damage to Others

Scenario	Which Coverage Responds	What to do if in an accident
CH2M Hill fleet, pool or project vehicle - long term lease - lower 48	CH2M Hill - Primary	Contact Broadspire (1-800-753-6737); Mary Ellegood-Oberts/DEN (720-286-2291); Linda George/DEN (720-286-2057)
CH2M Hill fleet, pool or project vehicle - long term lease - Alaska (North Slope)	CH2M Hill - Primary	Mary Ellegood-Oberts/DEN (720-286-2291)
Client vehicle driven by CH2M Hill employee	Client's auto policy unless client has made CH2M Hill responsible for vehicle	Contact Broadspire (1-800-753-6737); Mary Ellegood-Oberts/DEN (720-286-2291); contact client

Short term lease (30 days or less)	Rental car company if rented through Enterprise, Budget or Hertz; CH2M Hill excess	Contact Broadspire (1-800-753-6737); Contact local branch of rental car company where vehicle leased (ERAC includes 24 hour roadside assistance) and Mary Ellegood-Oberts/DEN (720-286-2291)
Short term lease (30 days or less)	CH2M Hill - Primary if rented through company other than our national agreements; $100,000 deductible	Contact Broadspire (1-800-753-6737); Contact rental car company and Mary Ellegood-Oberts/DEN (720-286-2291)
Personal vehicle used on business	Employee's personal auto policy; CH2M Hill on an excess basis	Contact personal auto insurance company; contact Mary Ellegood-Oberts/DEN (720-286-2291)

Physical Damage - damage to vehicle CH employee was driving

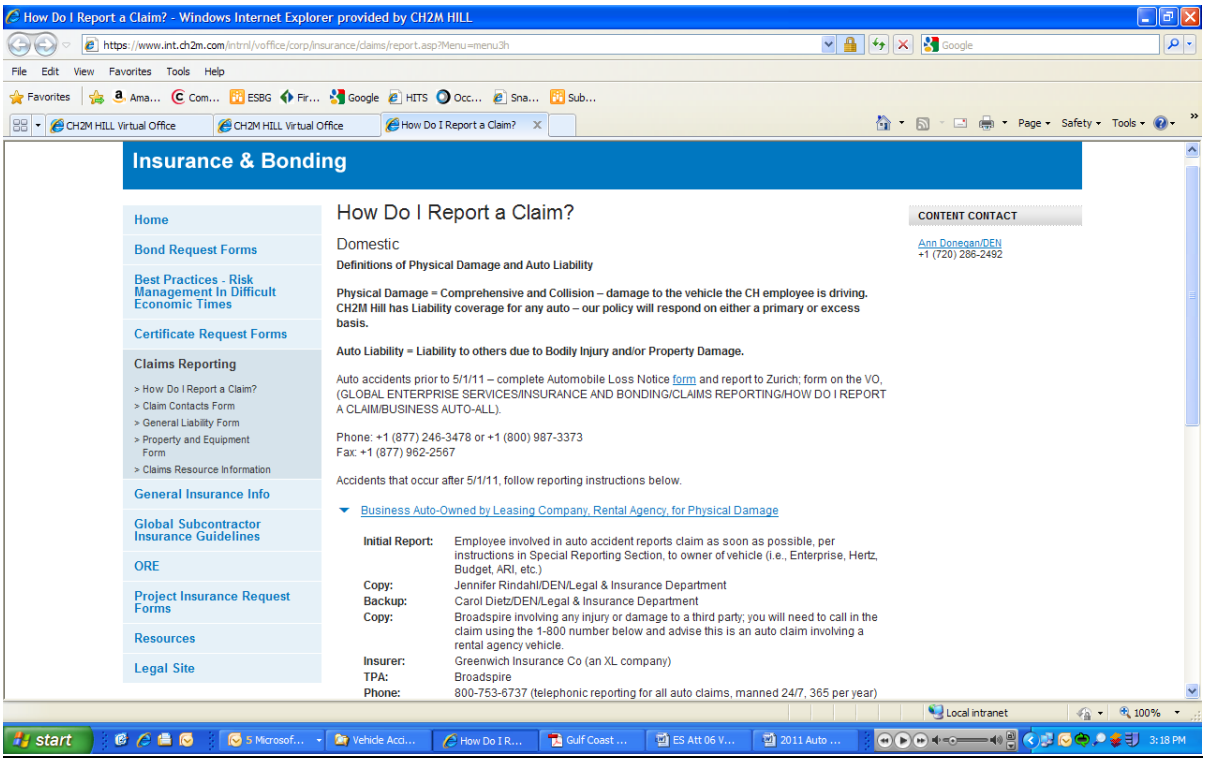
Scenario	Which Coverage Responds	What to do if in an accident
CH2M Hill fleet, pool or project vehicle - long term lease - lower 48	CH2M Hill ONLY if vehicle is scheduled on policy - $5,000 deductible	Contact Broadspire (1-800-753-6737); Mary Ellegood-Oberts/DEN (720-286-2291); Linda George/DEN (720-286-2057)
CH2M Hill fleet, pool or project vehicle - long term lease - Alaska (North Slope)	CH2M Hill Equipment Schedule if scheduled on policy	Contact Mary Ellegood-Oberts/DEN (720-286-2291)
CH2M Hill fleet, pool or project vehicle - long term lease	ARI if physical damage coverage purchased - $500 deductible	Contact Mary Ellegood-Oberts/DEN (720-286-2291); call ARI at 1-800-221-1645 give them Client Code and ARI fleet vehicle number; and notify Linda George/DEN - Fleet Coordinator - 720-286-2057
Client vehicle CH2M Hill Employee is driving	Client's auto policy unless client has made CH2M Hill contractually responsible for vehicle	Contact Mary Ellegood-Oberts/DEN (720-286-2291); contact client; contact Broadspire (1-800-753-6737)
Short term lease (30 days or less) using corporate VISA	VISA if corporate credit card used and vehicle is not a pickup, truck, cargo van or used off-road	Contact VISA - 1-800-847-2911 or http://www.visa.com/eclaim
Short term lease (30 days or less) through Enterprise (ERAC) and vehicle is used off-road and physical damage coverage included when vehicle leased	ERAC up to $3,000 in damage; CH2M Hill's coverage is excess	Notify Rental Car Company; contact Mary Ellegood-Oberts/DEN (720-286-2291) if damage over $5,000
Short term lease (30 days or less) did **not** use corporate VISA	CH2M Hill - $5,000 deductible (project responsibility)	Contact Broadspire (1-800-753-6737); Contact Mary Ellegood-Oberts/DEN (720-286-2291); contact VISA - 1-800-847-2911 or http://www.visa.com/eclaim
Personal vehicle used on business	CH will reimburse the amount of the deductible carried on the employee's policy up to $500 whichever is less	Contact Mary Ellegood-Oberts/DEN (720-286-2291); contact client; contact Broadspire (1-800-753-6737)

Details for reporting a claim on the CH2M Hill VO are accessed by going to the VO home page and clicking:

GLOBAL ENTERPRISE SERVICES/INSURANCE & BONDING/CLAIMS REPORTING

HOW DO I REPORT A CLAIM TAB or access the following URL:

https://www.int.ch2m.com/intrnl/voffice/corp/insurance/claims/report.asp?Menu=menu3h



For Personally Owned Vehicles (POVs):

CH2M HILL does not provide auto insurance for POVs, it is responsibility of the owner. If you are in a vehicle accident conducting company business, contact the police as above, supervisor, and 911 or CH2M HILL's occupational nurse/physician as stated above. Complete a HITS report. Contact Mary Ellegood-Oberts/DEN for assistance for meeting personal insurance deductibles (up to $500) with proof of insurance and deductible.

If using your POV for extended project use, notify the PM to make sure a rental car is not needed. Check your insurance policy for guidance on using the POV for business use.

Additional Resources:

Claims Resource Manual

CH2MHILL

WORKING ALONE PROTOCOL
CALL-IN CONTACT FORM

Date of site work: _____ Expected start time:

_____

Name of CH2M HILL employee in the field:

_____

Name of CH2M HILL employee responsible to receive contact: _____

Client Emergency Contact (if any):

CH2M HILL employee's contact numbers:

Radio # _____

Cell Phone # _____

Address and Location of work:

_____

Directions/Map:

Planned Activity:

_____

Specified Frequency and time for call in:

_____

_____

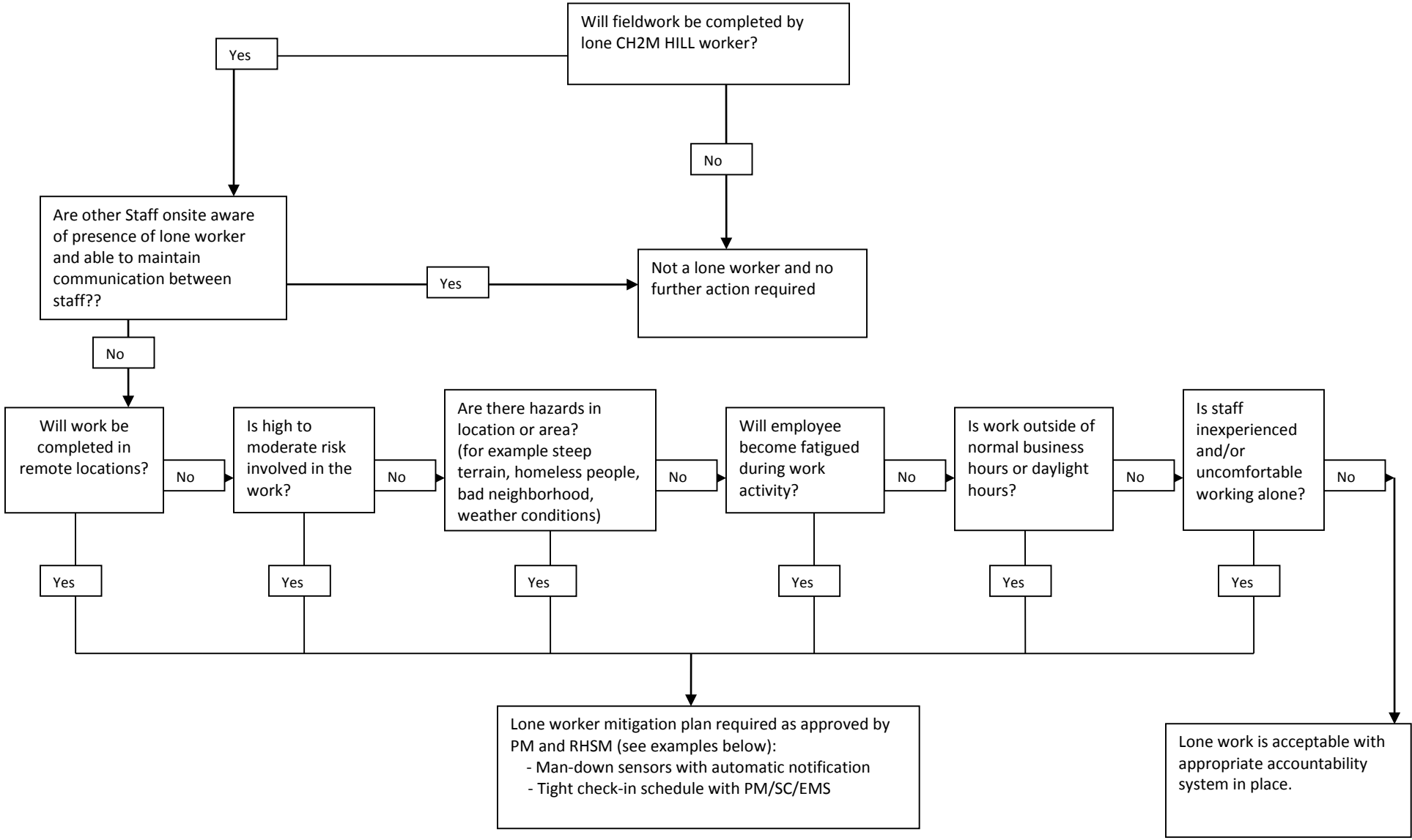
Time	Verified	Location

_____

If lone worker fails to call in at specified frequency/time:

1. Call worker's radio and cell to determine if an emergency exists.
2. If no reply, immediately call client security/emergency service if there is one at the site.
3. If there is no client security, call Emergency Services (911). Inform the dispatcher there is a lone worker that cannot be contacted and there may be an emergency onsite. Provide the lone worker's name, their last known location, and your contact information.
4. After Emergency Services have been contacted, call the other emergency contacts, PM, and Responsible Health and Safety Manager.

Lone Worker Protocol



CH2M HILL HEALTH AND SAFETY PLAN

Attachment 7

Observed Hazard Form

CH2MHILL

OBSERVED HAZARD FORM

Name/Company of Observer (*optional*):

Date reported:

Time reported:

Contractor/s performing unsafe act or creating unsafe condition:

1.

2.

3.

Unsafe Act or Condition:

Location of Unsafe Act or Condition:

Name of CH2M HILL Representative:

Corrective Actions Taken:

Date:

Project Safety Committee Evaluation:

Date:

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 8

Stop Work Order Form

CH2MHILL

STOP WORK ORDER

REPORT PREPARED BY:

Name:	Title:	Signature:	Date:

ISSUE OF NONPERFORMANCE:

Description:	Date of Nonperformance:

SUBCONTRACTOR SIGNATURE OF NOTIFICATION:

Name:	Title:	Signature:	Date:

** Corrective action is to be taken immediately. Note below the action taken, sign and return to CCI.* Work may not resume until authorization is granted by CH2M HILL Constructors, Inc. Representative,*

SUBCONTRACTOR'S CORRECTIVE ACTION

Description:	Date of Nonperformance:

SUBCONTRACTOR SIGNATURE OF CORRECTION

Name:	Title:	Signature:	Date:

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 9

Agency Inspection Target Zero Bulletin

Environmental Services Business Group

TARGET ZERO BULLETIN

Subject: HSSE Agency Inspections (OSHA, EPA, DOT, State Health Department)

Do you know what YOU would do if an agency inspector arrived at your site unannounced?

Recently, a State Occupational Safety and Health Administration (OSHA) inspector made an unannounced visit to one of our Federal project sites. OSHA, U.S. Environmental Protection Agency (EPA), and authorized state or local agencies have authority to inspect any facility that is subject to health, safety, and environmental legislation. Inspections may be announced or unannounced. This particular inspector indicated that the project was targeted for an inspection because the work was funded by the American Recovery and Reinvestment Act (ARRA).

Enterprise Standard Operating Procedure (SOP) HSE-201, *Agency Inspections and Communications,* describes the responsibilities, procedures, and requirements associated with inspections conducted by external regulatory agencies, as well as the methods for communicating information to key individuals. This Target Zero Bulletin is a brief summary of what to do in the event of an agency inspection at your site. Refer to the SOP for more specific guidance.

Notification of Inspections

- If the inspection is an announced regulatory agency inspection, the Project Manager (PM) should notify the Responsible Health and Safety Manager (RHSM) and Responsible Environmental Manager (REM) well in advance of the inspection.
- If an unannounced agency inspector visits one of our projects, Field personnel must immediately notify the project Emergency Response Coordinator (ERC). Typically the ERC is the Site Safety and Health Officer.
- The ERC must immediately notify the RHSM/REM, as appropriate, of unannounced inspections, or designate someone to call the RHSM/REM. The RHSM/REMs can provide guidance to the field staff and PM.

Inspector Credential Verification

- Upon arrival, the ERC must request the inspector to provide official credentials. Record the inspector's name and office phone number or obtain the inspector's business card.
- The inspector shall sign the visitors log and be given a site-specific health, safety, and environmental protection briefing.
- The inspector shall meet any site access requirements associated with security clearances, specialized training, and medical monitoring. The CH2M HILL representative shall verify that the inspector possesses these requirements; access will only be granted to those areas where appropriate access requirements are met. Some inspectors have the authority to gain access to any work area at any time, such as an inspector with a search warrant. In these cases, we can stop work operations as necessary to protect the safety of the inspector(s).

Opening Conference

- The CH2M HILL Project Manager, ERC, RHSM, or REM, and the inspector shall determine attendees for the opening conference. The RHSM (for OSHA and other worker health and safety inspections) or REM (for environmental inspections) shall join the opening conference via conference call.

- The inspector shall inform CH2M HILL of the purpose of the inspection and provide a copy of the complaint, if applicable.
- The inspector shall outline the scope of the inspection, including employee interviews conducted in private, physical inspection of the workplace and records, possible referrals, discrimination complaints, and the closing conference(s).

Requests for OSHA Logs

- An OSHA inspector may request to review the project OSHA Injury/Illness log, better known as the OSHA 300 Log. Contact your RHSM for assistance in obtaining the OSHA 300 Log.
- Field projects with a continuous duration of one year or longer are considered to be separate establishments and are required to maintain an OSHA 300 log specific to the project. The project OSHA 300 log should be maintained onsite and kept current.
- Recordable injuries and illnesses sustained on field projects less than one year in duration are maintained on the CH2M HILL office log where the injured employee is based.

The Inspection

- The scope of the inspection shall be limited to that indicated by the inspector in the opening conference. The inspector shall be escorted to relevant areas only. The ERC or other designated by the RHSM or REM must accompany the inspector during the inspection.
- Ensure that the inspection is limited to the scope that the inspector disclosed during the opening conference. The ERC should always take notes which identify: areas inspected, machinery or equipment and materials examined, employees or other persons interviewed, and photographs taken by the inspector.
- The inspector will observe safety, health, and environmental conditions and practices and document the inspection process. The inspector may also take photos and instrument readings, examine records, collect air samples, measure noise levels, survey existing engineering controls, and monitor employee exposure to toxic vapors, gases, and dusts.
- CH2M HILL should gather duplicate information (photographs, readings, samples) in the same manner and condition as the inspector. If the equipment needed to take duplicate samples is not onsite, ask the inspector if the sampling can wait until the equipment is available. If samples are taken, request a description of the tests that the agency intends to perform on the samples and request results as soon as they are available.
- Employees may be questioned during the inspection tour. The employee can refuse to speak to an inspector, can speak to the inspector with a company representative (including management) present, or can speak to the inspector privately. It is CH2M HILL policy that employees who wish to speak to the inspector are not discriminated against, intimidated, or otherwise mistreated for exercising their rights during compliance inspections.
- Copies of documents should not be provided to the inspector without the approval of the RHSM or REM or Legal Insurance Department (LID). **DO NOT** voluntarily release documents. Respond only to inspection team requests.
- During the course of the inspection, the inspector may point out violations. For each violation, the CH2M HILL representative should ask the inspector to discuss possible corrective action. Where possible, violations detected by the inspector should be corrected immediately and noted by the inspector as corrected.
- For those items which cannot be corrected immediately, an action plan shall be formulated for timely correction. In any instance, employees exposed to hazards shall be removed from the area.

Closing Conference

After the inspection, a closing conference is normally held as follows:

- The CH2M HILL PM, ERC, RHSM or REM shall be involved via conference call in the closing conference, at a minimum;
- The inspector shall describe the apparent violations found during the inspection and other pertinent issues as deemed necessary by the inspector. CH2M HILL shall be advised of their rights to participate in any subsequent conferences, meetings or discussions. Any unusual circumstances noted during the closing conference shall be documented by the ERC;
- The inspector shall discuss violations observed during the inspection and indicate for which violations a citation and a proposed penalty may be issued or recommended;
- The ERC shall request receipts for all samples and approved documents photocopied by the inspector, request a photocopy of the inspector's photograph log, and request a copy of the final inspection report; and
- Any documentation from an agency inspection must be transmitted immediately to the RHSM or REM, and LID.

Unannounced regulatory agency inspections may happen at any time on our projects -

Get your RHSM/REM and PM involved immediately if an Inspector arrives.

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 10

Completed CH2M HILL AHAs

Activity Hazard Analysis (AHA)

ACTIVITY/WORK TASK:	MEC Avoidance	Overall Risk Assessment Code (RAC) (Use highest code)					**M**
Indian Head Site 17	SIGNATURES	Activity #		AHA #			
PWD/OICC/ROICC OFFICE	**NAVFAC Washington**	**Risk Assessment Code (RAC) Matrix**					
NAME & DATE ACCEPTED BY GDA:		**Severity**	**Probability**				
CONTRACT NUMBER:	**N62470-11-D-8012**		Frequent	Likely	Occasional	Seldom	Unlikely
TASK ORDER/DELIVERY #:		Catastrophic	**E**	**E**	**H**	**H**	**M**
PRIME CONTRACTOR:	**CH2M HILL**	Critical	**E**	**H**	**H**	**M**	**L**
SUBCONTRACTOR:	**N/A (self-performed)**	Marginal	**H**	**M**	**M**	**L**	**L**
DATE OF PREPARATORY MEETING:		Negligible	**M**	**L**	**L**	**L**	**L**
DATE AND NAME OF REVIEWER							
CONTRACTOR COMPETENT PERSON:	Nelson Figeac						
SITE SAFETY and HEALTH OFFICER	Nelson Figeac						

ACCEPTANCE BY GOVERNMENT DESIGNATED AUTHORITY (GDA)	Review each **"Hazard"** with identified safety **"Controls"** and determine (RAC)
E = EXTREMELY HIGH (PWO/OICC/ROICC)	Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" .Place the highest RAC at the top of AHA. This is the overall risk assessment code for this activity
H = HIGH RISK (FEAD DIRECTOR)	**"Severity"** is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible after controls are in place
M = MODERATE RISK (CM or ET or PAR)	
L = LOW RISK (ET or PAR)	**"Probability"** is the likelihood to cause an incident, near miss, or accident did occur and identified as: Frequent, Likely, Occasional, Seldom, or Unlikely after controls are put in place.

Job Steps	Hazards	Controls	RAC
MEC Avoidance	Adverse weather	• Frequently observe the skyline for rain squalls and thunder storms systems that may develop. • Bring clothing suitable for anticipated daily weather conditions. • Shut down operations during heavy rain/lightning events or high wind conditions. For storms producing lightning, seek safe haven in a grounded structure or rubber vehicle. • Implement 30 – 30 rule. Do not seek refuge under trees during electrical or high wind storm events. • Do not use telephones during electrical storms, except in the case of emergency.	**L**

Job Steps	Hazards	Controls	RAC
	Biological	• Before starting field activities, notify supervisors of known allergies to stinging insects and location of antidotes. • Use insect repellant with DEET or other insect repellent to deter being bit by mosquitoes or other stinging/biting insects. • Avoid exposure to blood borne pathogens if first aid must be provided. Use universal precautions against exposure to blood borne pathogens. • Observe ground surfaces, enclosed structures, ground water well heads, surrounding vegetation other site features for presence of spiders, bee/wasp hives, other stinging insects etc. • Where exposure to poisonous plants that have oils, berries or needle-like projects could cause skin irritations, infections or allergic reactions use disposable coveralls for protection. • Tape pant legs to boots and ensure there are no open seams between boots and pant legs.	**L**
	Chemical exposure	• All personnel performing this task shall be trained and enrolled in a medical surveillance program in accordance with 29CFR1910.120. • Do not allow dermal contact or incidental ingestion of impacted soil/sediment or water. • Exercise good hygiene practices. Always wash hands before eating, drinking, smoking and leaving site. Shower as soon as possible after leaving the site. • Only eat, drink, smoke or chew tobacco in designated areas.	**L**
	Cuts/abrasions	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp/cut edges, shrapnel, or hand tools. • Avoid use of razor knives. • Only use a knife if it is the best tool for the job. Follow the CH2MHILL knife policy. • When cutting with knives, wear cut resistant work gloves, cut away from the body and never towards another worker. • Wear sturdy work boots to protect against cuts by sharp objects such as shrapnel and other metal debris.	**L**
	Driving	• Always use a seat belt while driving on military/government facilities. • Always observe posted speed limits, traffic signs and signals. • Never using a cell phone or two way radio while driving on military/government facilities. Violating these rules may result in loss of military/government facility driving privileges. Follow CH2MHILLL cell phone and driving policy.	**L**

Job Steps	Hazards	Controls	RAC
	Fire prevention	• Use only metal safety cans for storage and transfer of fuel. • Use funnels and nozzles during fueling operations. • Appropriately sized, easily accessible ABC fire extinguisher in work area. • Fire extinguishers must be inspected monthly (inspection tag) and have an annual maintenance/inspection certification (tag) attached to the extinguisher. • Only smoke in designated areas. Designated area must be free of combustible/flammable materials.	**L**
	Hand tools	• Select and use the proper tool for the task. • Do not use tools that have been damaged or repaired in a manner which is not consistent with manufacturer's requirements.	**L**
	High ambient temperature	• Provide and drink fluids to prevent worker dehydration. • Minimize intake of caffeinated fluids. • Institute a proper work-break regiment in a cool area to avoid heat stress symptoms and overexertion. • Monitor for signs and symptoms of heat stress (maintain use of buddy system) when the ambient air temperature exceeds 70°F, the relative humidity is high (>50 percent), or when workers exhibit symptoms of heat stress and especially when wearing disposable or other types of coveralls. 1) Heat Syncope = Sluggishness or fainting while standing erect or immobile in heat. *Treatment = Remove to cooler area. Rest lying down. Increase fluid intake. Recovery usually is prompt and complete.* 2) Heat Rash = Profuse tiny raised red blister-like vesicles on affected areas, along with prickling sensations during heat exposure. *Treatment = Use mild drying lotions and powders, and keep skin clean for drying skin and preventing infection.* 3) Heat Cramps = Painful spasms in muscles used during work (arms, legs, or abdomen); onset during or after work hours. *Treatment = Remove to cooler area. Rest lying down. Increase fluid intake.* 4) Heat exhaustion = Fatigue, nausea, headache, giddiness; skin clammy and moist; complexion pale, muddy, or flushed; may faint on standing; rapid pulse and low blood pressure; oral temperature normal or low. *Treatment = Remove to cooler area. Rest lying down, with head in low position. Administer fluids by mouth. Seek medical attention.* 5) Heat Stroke = Red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; high oral temperature. *Treatment = Cool rapidly by soaking in cool–but not cold–water. Call ambulance, and get medical attention immediately!*	**L**

Job Steps	Hazards	Controls	RAC
	Manual lifting	• CH2MHILL or subcontract personnel must notify supervisors or safety representatives of preexisting medical conditions that may be aggravated or re-injured by lifting activities, especially lifting operation involving repetitive motions. • When lifting objects, lift using knees not back. For repetitive lifting tasks, the use of lifting braces/supports may be considered. Use heavy equipment to transfer heavy or awkward loads wherever possible. Have someone assist with the lift— especially for heavy (> 40lbs.) or awkward loads. Do not attempt to manually lift objects that should otherwise be lifted with heavy equipment. • Plan storage and staging to minimize lifting or carrying distances. Make sure the path of travel is clear before the lift. Avoid carrying heavy objects above shoulder level.	**L**
	MEC/MPPEH avoidance	• **Provide UXO qualified personnel as required by the Explosives Safety Submission (ESS)/Explosives Site Plan (ESP) and precisely follow operational and Emergency Notification procedures in the event live or potentially live MEC/MPPEH is encountered.** • Anomaly Avoidance support must be provided to non-UXO qualified personnel performing tasks within a munitions response site as required by the CH2M HILL Safety Risk Evaluation (SRE) and/or the ESS/ESP. • In the event a potential MPPEH/MEC related discovery were to occur on-site by non-UXO qualified personnel, all work would cease and any operating heavy equipment will be shut-down and secured and the flowing procedures shall be executed: **1. Immediately Stop Work (RECOGNIZE):** *Do not disturb or move a suspect MEC/MPPEH hazard. Only trained UXO Technicians are authorized to investigate potential MEC/MPPEH hazards. Make sure that cell phones/two way radios or other electro-magnetic sources are not engaged in the area of the suspect item.* **2. Secure area/location where the UXO/MPPEH/MEC item is discovered (RETREAT):** *Stop and secure any operating equipment to the extent possible. Mark the general area/location of the UXO/MPPEH/MEC hazard with tape, colored cloth, or colored ribbon. Avoid using markers that penetrate the ground surface.* **3. Immediately make notification to SUXO or client EOD (REPORT):** Once area has been evacuated, appropriate notifications shall be made immediately to the site SUXOS, UXOSO/QCS, supervisor, project manager and Client. Provide as much information as possible, including location, approximate size, shape, color, and any other distinguishing features. 4**. Operations cannot resume until such safeguards and approvals are in place to safely continue the assigned work, in accordance with ESS approvals to do so.**	**M**

Job Steps	Hazards	Controls	RAC
	Noise	• Personnel adjacent to operating heavy equipment (drill rig) shall wear hearing protection	L
	Spill prevention	• Ensure that spill control and spill clean-up and materials are on hand before initiating any heavy equipment or fueling operations to prevent entry into sensitive receptors.	L
	Slips/trips/falls/housekeeping	• Be aware of poor footing, potential slipping/tripping hazards in the work area, such as wet surfaces, polyethylene sheeting, and where unprotected holes, drainage areas, rip rap, utilities, and ground protrusions. Observe, mark and avoid any of these identified conditions. • Use sturdy hard-toe work boots with sufficient ankle support. • Institute and maintain good housekeeping practices. Clean Work Areas as activities proceed. Remove and store materials from pathways and commonly traveled areas as soon as possible. • Three points of contact when enter/exiting equipment.	L
	Traffic control, impact with vehicle	• Wear safety vests when working near roadways or heavy equipment. • Make eye contact with equipment operator before approaching equipment.	L
	Visible lighting	• Perform tasks in daylight hours whenever possible. If dawn, dusk or dark work is to be performed portable lightly must be provided to sufficient illuminate work area(s).	L
	Drill rig safety while conducting MEC avoidance	• Drill rig either moved off hole and shut down (mast down when moving), or drill rig turned off, and driller away from controls, and aware that avoidance running down hole check.	

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
• Fire extinguisher (when using fuel and electrical sources) • Eye wash (small portable type) • Miscellaneous power and manual hand tools. • First Aid/BBP/CPR shield • Spill Kit • Communication devices. • MEC avoidance equipment (Schonstedt)	• Fire extinguisher training • Review APP/SSHP for new site personnel. • 1st Aid/CPR 1st Aid/CPR (2 per site). • Supervisors -SC-HW • (29CFR1910.120(e)(4), 10 hour OSHA Construction Safety Training or equivalent • Training and medical surveillance per 29CFR1910.120. • UXO TIII/UXO TII (DDESB TP-18) • UXO Avoidance for non-UXO personnel	• Monthly fire extinguisher inspection by competent employee, yearly inspection by licensed company. Monthly inspection tag should be attached. • Visual Inspections of designated work areas identify and address hazardous/MR conditions. • Emergency Response equipment Inspections (Fire Extinguishers, Eye wash First Aid/CPR etc.)

Activity Hazard Analysis (AHA)

ACTIVITY/WORK TASK:	Oversight subcontractors	Overall Risk Assessment Code (RAC) (Use highest code)					
Indian Head Site 17	SIGNATURES	Activity #		AHA #			
PWD/OICC/ROICC OFFICE		**Risk Assessment Code (RAC) Matrix**					
NAME & DATE ACCEPTED BY GDA:							
CONTRACT NUMBER:		**Severity**	**Probability**				
TASK ORDER/DELIVERY #:							
PRIME CONTRACTOR:			Frequent	Likely	Occasional	Seldom	Unlikely
SUBCONTRACTOR:		Catastrophic	E	E	H	H	M
DATE OF PREPARATORY MEETING:		Critical	E	H	H	M	L
DATE AND NAME OF REVIEWER		Marginal	H	M	M	L	L
CONTRACTOR COMPETENT PERSON:		Negligible	M	L	L	L	L
SITE SAFETY and HEALTH OFFICER							
ACCEPTANCE BY GOVERNMENT DESIGNATED AUTHORITY (GDA)		Review each **"Hazard"** with identified safety **"Controls"** and determine (RAC)					
E = EXTREMELY HIGH (PWO/OICC/ROICC)		Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" .Place the highest RAC at the top of AHA. This is the overall risk assessment code for this activity					
H = HIGH RISK (FEAD DIRECTOR)		**"Severity"** is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible after controls are in place					
M = MODERATE RISK (CM or ET or PAR)							
L = LOW RISK (ET or PAR)		**"Probability"** is the likelihood to cause an incident, near miss, or accident did occur and identified as: Frequent, Likely, Occasional, Seldom, or Unlikely after controls are put in place.					

Job Steps	Hazards	Controls	RAC
Preparation for work	General preparedness Medical emergency Strains/sprains Fire	• Complete HASP, AHA review • Complete PTSP, daily safety meeting. • Check for cell phone coverage or have radio or satellite phone. • Designate rally point and evacuation point (daily if working in new locations each day). • Drive to designated hospital emergency room before first day start of work or during first day of work. Make sure everyone on job site knows directions to ER. • Check daily weather report and plan activities around severe weather/poor driving conditions. Review, inspect and locate safety equipment including fire extinguisher, first aid kit, insect repellant, PPE, water, food, rain gear, etc • Utilize proper lifting procedure when loading and unloading vehicles and equipment and suitcases when traveling. • Keep load weight to under 50 lbs, and use mechanical means when possible to avoid having to carry the full weight. • Bend down at the knees and lift with your legs rather than bending and lifting with your back. Do not lift and twist.	L

Job Steps	Hazards	Controls	RAC
		• Required safety equipment for each vehicle includes: first aid kit; personal eye-wash; potable water; cell phone; and a fully charged fire extinguisher (rated 2-A:10-B-C). If you are required to utilize a fire extinguisher, use the following technique (PASS): **P**ull cotter pin **A**im at the base of the fire **S**queeze the handle • **S**weep the extinguisher hose back and forth.	
	Inclement weather	• Sudden inclement weather can rapidly encroach upon field personnel. Preparedness and caution are the best defenses. Carry clothing appropriate for inclement weather. Realize ice and snow can adversely affect driving conditions, and plan accordingly. • Take heed of the weather forecast for the day and pay attention for signs of changing weather that indicate an impending storm. Signs include towering thunderheads, darkening skies, or a sudden increase in wind. If stormy weather ensues, field personnel should discontinue work and seek shelter until the storm has passed. • Avoid working during thunderstorms. • If caught in one, seek shelter. • Avoid lone trees as shelter and open, bare areas. • Do not cross water bodies. • If caught in open area, place feet close together and crouch down as small as possible, without lying on the ground. • Ground strikes are known to be initiated by “leaders”, or charges, from the earth making a connection to the charge in the clouds. This may cause your hair to stand up, and since you do not want to be part of a leader that makes the connection to form a cloud-to-ground strike, immediately crouch as described above. • Avoid low lying areas such as washes after rain as they can flood. • Take time to review where the closest structure that can be used when severe weather occurs and what route will be used to get there. Listen to weather reports and plan for severe weather. Designate an emergency evacuation assembly area and evacuation routes for non-weather related emergencies (fire, etc.). Keep a copy of the Emergency Contact page from the HSP accessible. • Remember that lightning may strike several miles from the parent cloud, so work will be stopped and restarted accordingly. Seek refuge when thunder sounds or there is visible lightning. Do not resume activity until 30 minutes after the last thunder clap or lightning strike.	**L**

Job Steps	Hazards	Controls	RAC
Drive to closest access point for site.	Auto accidents.	• Inspect the vehicle prior to departure. • If driving a rental car, become familiar with the safe operation of vehicles of the type and size to be operated. Large vehicles such as full size vans and pick-ups have different vision challenges and handling characteristics than smaller vehicles. • Drivers shall not use cellular phones, or other two-way communication devices while driving (including hands-free devices). Pull over and park the car to make or take phone calls, text, or e-mail. • Be sure to take adequate rest breaks when driving, especially on long distance trips. • Obey speed limits; be aware of blind spots or other hazards associated with low visibility. Practice defensive driving techniques, such as leaving plenty of room between your vehicle and the one ahead of you. • Do no drive while drowsy. Drowsiness can occur at any time, but is most likely after 18 hours or more without sleep. • Maintain focus on driving. Eating, drinking, smoking, adjusting controls can divert attention from the road. Take the time to park and perform these tasks when parked rather than while driving. • If vehicle is malfunctioning, don't pull over off the road suddenly. Give the traffic behind you notice that you are pulling off. • Park as far from traffic as possible, use caution when exiting vehicle. • Always wear seatbelt in vehicle, regardless of length of drive. • Use vehicle flashers if moving slower than normal traffic. • Pull off the road, put the car in park and turn on flashers before talking on a mobile phone, even with a hands-free device. • Apply Get Out and Look (GOAL) when returning to the vehicle to prevent property damage and injury by looking for obstructions, personnel or other items. Back slowly and use a spotter when view is obstructed. It is preferable to park in a spot that you can pull forward out of, less preferable to back into a parking spot so you can pull straight out of it, and least preferable to drive into a parking spot that you have to back out of.	**L**

Job Steps	Hazards	Controls	RAC
General oversight	Biological hazards Snakes Ticks Poison Ivy/oak Wasps/Bees	Watch for animal hazards in wooded and high grassy areas (i.e. snakes, rabid raccoons, etc.); follow SSHP for snake hazards. Watch where you put your feet. Ticks. • Wear light colored long sleeve shirts and pants. Use repellent on exposed skin (with at least 35% DEET) if ticks/other biting insects are suspected in the area. Whenever you use an insecticide or insect repellent, be sure to read and follow the manufacturer's directions for us, as printed on the product. Tape bottoms of pant legs or tuck pants into socks. Use permethrin on shirts, pants and socks, as per application instructions prior to donning clothing. • Wear protective clothing such as Tyvek or Bug-out suits if ticks are abundant in addition to controls above. • Have tick removal kits accessible. Use the buddy system and perform tick inspections prior to entering the field vehicle. If ticks were not planned to be encountered and are observed, do not continue field work until these controls can be implemented. • See Tick Fact Sheet attached to the HSP for further precautions and controls to implement when ticks are present. Follow Navy CLEAN tick protocol. If bitten by a tick, follow the removal procedures found in the tick fact sheet, call the occupational nurse at 1-866-893-2514. • Try to avoid high grass or the boundary between woods and fields where ticks congregate. • Do a careful tick check at the end of the day. • All tools used in the poison ivy, sumac or oak area, including those used to cut back poison oak, surveying instruments used in the area, air monitoring equipment or other test apparatus must be decontaminated before they are placed back into the site vehicle. If on-site decontamination is not possible, use plastic to wrap any tools or equipment until they can be decontaminated. • Personal protective equipment, including Tyvek coveralls, gloves, and boot covers must be worn if poison ivy/oak cannot be avoided. PPE must be placed into plastic bags and sealed if they are not disposed immediately into a trash receptacle. • As soon as possible following the work, shower to remove any potential contamination. Any body part with suspected or actual exposure should be washed with Zanfel, Tecnu or other product designed for removing urushiol. If you do not have Zanfel or Tecnu wash with cold water. Do not take a bath, as the oils can form and invisible film on top of the water and contaminate your entire body upon exiting the bath. • Tecnu may also be used to decontaminate equipment.	**L**

Job Steps	Hazards	Controls	RAC
		• Use IvyBlock or similar products to prevent poison oak, ivy and sumac contamination. Check with the closest CH2M HILL warehouse to see if these products are available. Follow all directions for application. • If you do come into contact with one of these poisonous plants and a reaction develops, contact your supervisor and the occupational nurse 1-866-893-2514. • Check for bees/wasp/spider nests before reaching into/behind any objects. Always wear leather gloves when reaching into areas. • Report all bites stings to your supervisor or SC. • Inform supervisor if you are allergic to bees.	
General oversight	MEC	Follow 3Rs training, don't pick up anything you didn't put down. When in doubt, retreat and report.	**L**
General oversight	Heat stress	Follow SAHP guidelines for heat stress. Drink plenty of fluids. Take breaks as necessary. Watch yourself and your co-worker for signs of heat stress. Make sure to carry sufficient drinking water and sports drinks with you. Keep a cooler in the car with cool water bottles and sports drinks. Use physiological monitoring as required by HSP, and document results on physiological monitoring forms.	**L**
General oversight	Cold stress	• Be prepared for all types of weather by having cold weather gear (including rain gear) in the field vehicle as weather in the mountains can change rapidly. Dress in layers. • Obtain and review daily weather forecast and adjust work schedule based on work conditions (and driving conditions). • Observe one another for signs of cold-related disorders (see HSP for review of signs and symptoms). • Stay hydrated. Drink 16 ounces of water before beginning work. Do not use alcohol in place of water or other nonalcoholic fluids. Decrease your intake of coffee and caffeinated soft drinks during working hours. • Take regular breaks in a warm shelter for cold weather. • Follow the cold stress monitoring requirements outlined in the HASP. • Follow Wind Chill Chart to assist with work warming regiment determination and frostbite avoidance. • Persons who experience signs of cold stress should contact the PM and RHSM. Call the occupational nurse first if symptoms are severe at 1-866-893-2514.	**L**
General oversight	Sunburn	Wear a hat and sun screen as necessary. Wear long sleeve shirts and long pants. Use sunscreen every morning before the sun gets hot.	**L**

Job Steps	Hazards	Controls	RAC
General oversight	Injury due to improper use of hand tools (including cuts, strains, flying debris, etc.) Slips, trips, and falls	• Inspect all tools before each use. • Complete the Self Assessment Checklist for hand tools • Personnel will be trained in the proper use of hand tools. • All power tools will be energized through a GFCI or double insulated. • Wear proper PPE (safety glasses with side shields, safety-toed boots and work gloves) • Be aware of trip hazards/muddy/slippery surfaces. Maintain secure footing.	**L**
Depart From Site	Traffic, pedestrian, and obstacle hazards	• Ensure site is clean and nothing is left behind. • Drive defensively, wear your seatbelt, obey all traffic laws, and know the route to site prior to trip. • Be aware of how weather conditions may affect driving safety.	**L**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
surveying equipment	Equipment specific training	Daily before use
Fire extinguisher(s)	Fire extinguisher training	Monthly CH2MHILL inspection documented on card, yearly licensed inspector inspection, documented with new card
PPE		Inspect before use
First Aid/Bloodborne pathogen/CPR kit	First aid training/CPR training	Inspect prior to start of job

PRINT NAME **SIGNATURE**

Supervisor Name: _____ _____ **Date/Time:** _____

Safety Officer Name: _____ _____ **Date/Time:** _____

Employee Name(s): _____ _____ **Date/Time:** _____

_____ _____ **Date/Time:** _____

_____ _____ **Date/Time:** _____

_____ _____ **Date/Time:** _____

_____ _____ **Date/Time:** _____

_____ _____ **Date/Time:** _____

_____ _____ **Date/Time:** _____

_____	_____	**Date/Time:** _____
_____	_____	**Date/Time:** _____
_____	_____	**Date/Time:** _____
_____	_____	**Date/Time:** _____
_____	_____	**Date/Time:** _____
_____	_____	**Date/Time:** _____
_____	_____	**Date/Time:** _____
_____	_____	**Date/Time:** _____
_____	_____	**Date/Time:** _____
_____	_____	**Date/Time:** _____
_____	_____	**Date/Time:** _____
_____	_____	**Date/Time:** _____

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 11

Material Safety Data Sheets

Material Safety Data Sheet

Revision 0: 2/15/2005 **ID: 4594615**

Material Name: Draeger Tubes™ (which are not classified as dangerous goods)

* * * Section 1 - Chemical Product and Company Identification * * *

Product Use: Detection of gases, measuring of gas concentrations.

Manufacturer Information

Dräger Safety AG & Co. KGaA
Revalstr. 1
23560 Lübeck
Germany

Distributor/Contact Information

Draeger Safety, Inc
101 Technology Drive
Pittsburgh, PA 15275-1057

Phone: (412) 787-8383
Fax: (412) 787-2207
Emergency # 1-800-424-9300 (CHEMTREC)

General Comments

NOTE: Emergency telephone numbers are to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure, or accident involving chemicals. All non-emergency questions should be directed to customer service.

Relevant Products

Part No.	Trade Name	Part No.	Trade Name
67 26 665	Acetaldehyde 100/a	81 01 071	Acetic Acid 10/a-D
67 22 101	Acetic Acid 5/a	CH 22 901	Acetone 100/b
81 03 381	Acetone 40/a	67 28 591	Acrylonitrile 0.5/a
CH 26 901	Acrylonitrile 5/b	81 01 141	Active Tube for Formaldehyde 0.2A
CH 29 701	Alcohol 100/a	81 01 631	Alcohol 25/a
81 01 061	Amine Test	81 01 711	Ammonia 0.25/a
CH 31 901	Ammonia 0.5%/a	67 28 231	Ammonia 10/a-L
67 33 231	Ammonia 2/a	81 01 301	Ammonia 20/a-D
CH 20 501	Ammonia 5/a	81 01 941	Ammonia 5/b
67 33 171	Aniline 0.5/a	CH 20 401	Aniline 5/a
CH 25 001	Arsine 0.05/a	81 03 410	Fumigation-Test-Set
67 28 561	Benzene 0.5/a	67 18 801	Benzene 5/a
81 01 691	Petroleum Hydrocarbons 10A	67 30 201	Petroleum Hydrocarbons 100A
81 01 161	Butadiene 10/a-D	CH 30 801	Carbon Dioxide 0.01%/a
CH 23 501	Carbon Dioxide 0.1%/a	CH 31 401	Carbon Dioxide 0.5%/a
CH 25 101	Carbon Dioxide 1%/a	81 01 051	Carbon Dioxide1% a-D
81 01 811	Carbon Dioxide 100/a	67 28 521	Carbon Dioxide 100/a-P
67 28 611	Carbon Dioxide 1000/a-L	CH 20 301	Carbon Dioxide 5%/A
81 01 381	Carbon Dioxide 500/a-D	81 01 891	Carbon Disulphide 3/a
CH 23 201	Carbon Disulphide 30/a	81 01 951	Carbon Monoxide 10/c
81 03 321	Carbon Monoxide 10/d	67 33 191	Carbon Monoxide 50/a-D
81 01 791	Carbon Tetrachloride 0.2/b	81 01 021	Carbon Tetrachloride 1/a
CH 27 401	Carbon Tetrachloride 5/c	81 03 140	CDS Set I
81 03 150	CDS Set II	81 03 160	CDS Set III
81 03 200	CDS Set V	CH 24 301	Chlorine 0.2/a
67 28 411	Chlorine 0.3/b	CH 20 701	Chlorine 50/a
67 28 761	Chlorobenzene 5/a	67 18 601	Chloroformates 0.2/b
67 18 901	Chloroprene 5/a	67 28 681	Chromic Acid 0.1/a
67 28 791	Cyanide 2/a	CH 19 801	Cyanogen Chloride 0.25/a
67 25 201	Cyclohexane 100/a	67 28 931	Cyclohexylamine 2/a
67 30 501	Diethyl Ether 100/a	67 18 501	Dimethyl Formamide 10/b
67 18 701	Dimethyl Sulphate 0.005/c	67 28 451	Dimethyl Sulphide 1/a
67 28 111	Epichlorohydrin 5/b	81 01 151	Ethanol 1000/a-D
CH 20 201	Ethyl Acetate 200/a	67 28 381	Ethyl Benzene 30/a
67 26 801	Ethyl Glycol Acetate 50/a	81 01 331	Ethylene 0.1/a

81 01 351	Ethylene Glycol 10	67 28 961	Ethylene Oxide 1/a
67 28 241	Ethylene Oxide 25/a	81 01 491	Fluorine 0.1/a
67 33 081	Formaldehyde 0.2/a	81 01 751	Formaldehyde 2/a
67 22 701	Formic Acid 1/a	67 28 391	Hexane 100/a
81 03 351	Hydrazine 0.01/a	67 33 121	Hydrazine 0.2/a
CH 31 801	Hydrazine 0.25/a	67 28 571	Hydro Carbon 100/a-L
81 01 681	Hydrochloric Acid / Nitric Acid 1/a	CH 29 501	Hydrochlorid Acid 1/a
67 33 111	Hydrochloric Acid 10/a-D	67 28 181	Hydrochloric Acid 50/a
CH 25 701	Hydrocyanic Acid 2/a	67 33 221	Hydrocyanic Acid 20/a-D
81 01 511	Hydrogen 0.2%/a	CH 30 901	Hydrogen 0.5%/a
81 03 251	Hydrogen Fluoride 0.5/a	CH 30 301	Hydrogen Fluoride 1.5/b
81 01 041	Hydrogen Peroxide 0.1/a	CH 28 201	Hydrogen Sulphide + Sulphur Dioxide 0.2%/A
CH 28 101	Hydrogen Sulphide 0.2%/A	81 01 461	Hydrogen Sulphide 0.2/a
81 01 991	Hydrogen Sulphide 0.2/b	67 28 041	Hydrogen Sulphide 0.5/a
67 19 001	Hydrogen Sulphide 1/c	81 01 831	Hydrogen Sulphide 1/d
67 33 091	Hydrogen Sulphide 10/a-D	CH 29 101	Hydrogen Sulphide 100/a
81 01 211	Hydrogen Sulphide 2%/a	67 28 821	Hydrogen Sulphide 2/a
81 01 961	Hydrogen Sulphide 2/b	67 28 141	Hudrogen Sulphide 5/a-L
CH 29 801	Hydrogen Sulphide 5/b	81 03 281	Mercaptan 0.1/a
67 28 981	Mercaptan 0.5/a	81 01 871	Mercaptan 20/a
CH 23 101	Mercury Vapour 0.1/b	81 03 391	Methyl Bromide 0.2/a
81 01 671	Methyl Bromide 0.5/a	67 28 211	Methyl Bromide 3/a
CH 27 301	Methyl Bromide 5/b	81 03 071	Natural Gas odorization, tert-Butyl mercaptan (TBM)
CH 19 501	Nickel Tetracarbonyl 0.1/a	67 28 311	Nitric Acid 1/a
CH 30 001	Nitrogen Dioxide 0.5/c	81 01 111	Nitrogen Dioxide 10/a-D
67 19 101	Nitrogen Dioxide 2/c	CH 29 401	Nitrous Fumes 0.5/a
CH 31 001	Nitrous Fumes 2/a	67 24 001	Nitrous Fumes 20/a
67 28 911	Nitrous Fumes 5/a-L	81 01 921	Nitrous Fumes 50/a
CH 27 701	Nitrous Fumes 100/c	CH 31 201	Olefines 0.05%/a
CH 26 303	Organic Arsenic Compounds	CH 25 903	Organic Basic Nitrogen Compounds
67 33 181	Ozone 0.05/b	CH 21 001	Ozone 10/a
67 24 701	Pentane 100/a	81 01 551	Perchloroethylene 0.1/a
CH 30 701	Perchloroethylene 10/b	81 01 501	Perchloroethylene 2/a
81 01 401	Perchloroethylene 200/a-D	81 01 641	Phenol 1/b
81 01 521	Phosgene 0.02/a	CH 19 401	Phosgene 0.05/a
CH 28 301	Phosgene 0.25/c	81 01 611	Phosphine 0.01/a
CH 31 101	Phosphine 0.1/a	81 03 341	Phosphine 0.1/b in Acetylene
81 01 801	Phosphine 1/a	81 01 621	Phosphine 25/a
CH 21 201	Phosphine 50/a	67 28 461	Phosphoric Acid Ester 0.05/a
67 28 651	Pyridine 5/A	81 01 121	Acid Test
81 03 380	Simultaneous Test-Set for Container Fumigation	81 03 170	Simultaneous Test Set Indicator Substances
81 01 735	Simultaneous Test-Set I for inorganic fumes	81 01 736	Simultaneous Test-Set II for inorganic fumes
81 01 770	Simultaneous Test-Set III for organic vapours	67 23 301	Styrene 10/a
CH 27 601	Styrene 50/a	67 27 101	Sulphur Dioxide 0.1/a
67 28 491	Sulphur Dioxide 0.5/a	CH 31 701	Sulphur Dioxide 1/a
67 28 921	Sulphur Dioxide 2/a-L	CH 24 201	Sulphur Dioxide 20/a
81 01 091	Sulphur Dioxide 5/a-D	81 01 531	Sulphur Dioxide 50/b
67 28 781	Sulphuric Acid 1/a	81 01 341	Tetrahydrothiophene 1/b
CH 25 803	Thioether	81 01 731	Toluene 100/a
81 01 421	Toluene 100/a-D	CH 23 001	Toluene 5/a
81 01 661	Toluene 5/b	81 01 701	Toluene 50/a
67 24 501	Toluene Diisocyanate 0.02/A	CH 21 101	Trichloroethane 50/d
CH 24 401	Trichloroethylene 10/a	67 28 541	Trichloroethylene 2/a
81 01 441	Trichloroethylene 200/a-D	81 01 881	Trichloroethylene 50/a
67 18 401	Triethylamine 5/a	81 01 721	Vinyl Chloride 0.5/b
67 28 031	Vinyl Chloride 1/a	CH 19 601	Vinyl Chloride 100/a

CH 23 401	Water Vapour 0.1	81 01 321	Water Vapour 0.1/a
81 01 081	Water Vapour 1/a	81 01 781	Water Vapour 1/b
81 03 061	Water Vapour 20/a-P	67 28 531	Water Vapour 5/a-P

* * * Section 2 - Composition / Information on Ingredients * * *

CAS #	Component	Percent*
Not Available	Inert carrier material and glass of the tube	<90
Not Available	Copper salts	0-10
7803-57-8	Hydrazine hydrate	0-6
7664-93-9	Sulfuric acid	0-5
110-86-1	Pyridine	0-5
Not Available	Amine compounds	0-3
7553-56-2	Iodine	0-3
Not Available	Chromium (VI) salts	0-2
108-24-7	Acetic anhydride	0-1
Not Available	Gold salts	0-1
Not Available	Selenium salts	0-1
Not Available	Sodium salts	0-1
1330-20-7	Xylene	0-1
95-53-4	o-Toluidine	0-0.5
7647-01-0	Hydrochloric acid	0-0.5
Not Available	Palladium, inorganic compounds	0-0.2
7722-64-7	Potassium permanganate	0-0.2
91-66-7	N,N-Diethylaniline	0-0.2
10294-42-5	Cerium sulfate	0.1
2494-56-6	Butyrylcholiniodide	0-0.1
98-01-1	Furfurol	0-0.1
Not Available	Lead salts	0-0.1
12029-98-0	Iodine pentoxide	0-0.1
Not Available	Silver salts	0-0.1
22752-98-3	Pyridylpyridinium chloride	0-0.1
13435-46-6	Bariumchloroanilate	0-0.1
50-00-0	Formaldehyde	0-0.1
119-26-6	2,4-Dinitrophenylhydrazine	0-0.1
Not Available	Mercury salts	0-0.1
119-90-4	o-Dianisidine	0-0.1
10034-81-8	Magnesium perchlorate	0-0.1
Not Available	Bismuth compounds	0-0.05
7440-67-7	Zirconium	0-0.0005

Component Information/Information on Non-Hazardous Components

This product is considered not hazardous under 29 CFR 1910.1200 (Hazard Communication).

*based on the gross weight of the Draeger-Tube™.

The information contained in this MSDS is applicable to the contents of the Draeger-Tube™.

* * * Section 3 - Hazards Identification * * *

Emergency Overview

This product is a non-flammable, granulate filled glass tube. Contents of the tube are corrosive to the eyes, skin, gastrointestinal tract and may cause irritation to the respiratory tract. Improper handling, leaks and/or damage to the tube may release caustic sulfuric acid in liquid or solid form. Tube contents may react vigorously with water.

Potential Health Effects: Eyes

Eye contact with contents of tube and vapor or mist from the tube may cause corrosive damage with severe irritation, burns, and possible eye injury.

Potential Health Effects: Skin

Skin contact with contents of tube and vapor or mist from the tube may cause corrosive damage with severe irritation and burns. Burns may be enhanced in the presence of water.

Potential Health Effects: Ingestion

Product contents may be harmful or fatal if swallowed. This product may produce corrosive damage to the gastrointestinal tract if it is swallowed.

Potential Health Effects: Inhalation

Inhalation of vapor or mist from tube contents may cause severe irritation or injury to the respiratory system. Inhalation of vapor or mist from tube contents may cause pulmonary edema, emphysema, and permanent changes in pulmonary function

HMIS Ratings: Health: 3 **Fire:** 0 **Physical Hazard:** 2 **Pers. Prot.:** gloves, safety glasses with side shields

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard

* * * Section 4 - First Aid Measures * * *

First Aid: Eyes

Immediately flush eyes with water for at least 15 minutes, while holding eyelids open. Seek medical attention at once. Danger of corneal clouding.

First Aid: Skin

Rinse with plenty of water. Discard any shoes or clothing items that cannot be decontaminated. If irritation persists, get medical attention.

First Aid: Ingestion

If the material is swallowed, get immediate medical attention or advice -- Do not induce vomiting.

First Aid: Inhalation

If mist or vapor of this product is inhaled, remove person immediately to fresh air. Seek medical attention if symptoms develop or persist.

First Aid: Notes to Physician

Tube contents can be neutralized with lime and water, or rinsed with plenty of water, then treated with polyethylene glycol 400. After ingestion, there is a danger of the esophagus and the stomach becoming perforated.

* * * Section 5 - Fire Fighting Measures * * *

Flash Point: Not applicable
Method Used: Not applicable
Upper Flammable Limit (UFL): Not applicable
Lower Flammable Limit (LFL): Not applicable
Auto Ignition: Not applicable
Flammability Classification: Not applicable
Rate of Burning: Not applicable

General Fire Hazards

This material is non-flammable. Contents of tube and vapors released from broken tube may be corrosive to eyes, skin, respiratory and gastrointestinal tract. Burns may be enhanced in the presence of water.

Hazardous Combustion Products

Thermal decomposition of tube contents may produce toxic sulfur oxides, carbon monoxide, etc.

Extinguishing Media

Dry chemical, carbon dioxide. Adapt extinguishing media to the environment. Materials in the glass tubes are non-flammable. Avoid direct contact of this product with water since this can cause a violent exothermic reaction.

Fire Fighting Equipment/Instructions

Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask.

NFPA Ratings: Health: 3 **Fire:** 0 **Reactivity:** 2

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

* * * Section 6 - Accidental Release Measures * * *

Containment Procedures

Not applicable.

Clean-Up Procedures

Sweep up or scrape broken tubes into container for disposal. Avoid the generation of dusts during clean-up. Do not pick up glass with bare hands. Dilute tube contents with water and baking soda. Shovel material into appropriate container for disposal. Thoroughly wash the area with water after a spill or leak clean-up.

Evacuation Procedures

Isolate area. Keep unnecessary personnel away.

Special Procedures

Follow all Local, State, Federal and Provincial regulations for disposal.

* * * Section 7 - Handling and Storage * * *

Handling Procedures

Contents are corrosive. Do not get this material in contact with skin or eyes. Do not inhale vapors or mists of this product. Avoid contact with water. Tubes are not recommended for qualitative mask fit-testing. Open tubes should be capped and stored in a well ventilated area until they are disposed of or completely used.

Storage Procedures

Keep the container tightly closed and dry. Do not store above 77º F (25º C). Store the product in original packaging. The expiry date on the packaging must be considered.

* * * Section 8 - Exposure Controls / Personal Protection * * *

Exposure Guidelines

A: General Product Information

With normal handling of product there should be no exposure to contents. However, if exposure does occur, follow the recommended exposure limits.

B: Component Exposure Limits

Sulfuric acid (7664-93-9)

ACGIH: 0.2 mg/m3 TWA (thoracic fraction)
OSHA: 1 mg/m3 TWA
NIOSH: 1 mg/m3 TWA

Pyridine (110-86-1)

ACGIH: 1 ppm TWA
OSHA: 5 ppm TWA; 15 mg/m3 TWA
NIOSH: 5 ppm TWA; 15 mg/m3 TWA

Iodine (7553-56-2)

ACGIH: 0.1 ppm Ceiling
OSHA: 0.1 ppm Ceiling; 1 mg/m3 Ceiling
NIOSH: 0.1 ppm Ceiling; 1 mg/m3 Ceiling

Chromium (VI) salts (Not Available)

OSHA: 0.1 mg/m3 Ceiling
NIOSH: 0.001 mg/m3 TWA (as Cr)

Xylene (1330-20-7)

ACGIH: 100 ppm TWA
150 ppm STEL
OSHA: 100 ppm TWA; 435 mg/m3 TWA
150 ppm STEL; 655 mg/m3 STEL

Acetic anhydride (108-24-7)

ACGIH: 5 ppm TWA
OSHA: 5 ppm Ceiling; 20 mg/m3 Ceiling
NIOSH: 5 ppm Ceiling; 20 mg/m3 Ceiling

o-Toluidine (95-53-4)

ACGIH: 2 ppm TWA
skin - potential for cutaneous absorption
OSHA: 5 ppm TWA; 22 mg/m3 TWA
Prevent or reduce skin absorption
NIOSH: Potential for dermal absorption

Hydrochloric acid (7647-01-0)

ACGIH: 2 ppm Ceiling
OSHA: 5 ppm Ceiling; 7 mg/m3 Ceiling
NIOSH: 5 ppm Ceiling; 7 mg/m3 Ceiling

Furfurol (98-01-1)

ACGIH: 2 ppm TWA
skin - potential for cutaneous absorption
OSHA: 2 ppm TWA; 8 mg/m3 TWA
Prevent or reduce skin absorption

Formaldehyde (50-00-0)

ACGIH: 0.3 ppm Ceiling
OSHA: 0.75 ppm TWA; 2 ppm STEL; 0.5 ppm Action Level (Irritant and potential cancer hazard - see 29 CFR 1910.1048)
NIOSH: 0.016 ppm TWA
0.1 ppm Ceiling (15 min)

Zirconium (7440-67-7)

ACGIH: 5 mg/m3 TWA
10 mg/m3 STEL
OSHA: 5 mg/m3 TWA
10 mg/m3 STEL
NIOSH: 5 mg/m3 TWA
10 mg/m3 STEL

Engineering Controls

Use general ventilation.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face

Wear safety glasses with side shields.

Personal Protective Equipment: Skin

Use impervious gloves. Observe the glove manufacturer's instructions on permeability and rupture times as well as the specific workplace conditions. Wash thoroughly after handling.

Personal Protective Equipment: Respiratory

If ventilation is not sufficient to effectively prevent buildup of aerosols or vapors, appropriate NIOSH/MSHA respiratory protection must be provided.

Personal Protective Equipment: General

Use good industrial hygiene practices in handling this material.

* * * Section 9 - Physical & Chemical Properties * * *

Appearance:	Glass tubes containing colorless and/or colored solids.	**Odor:**	Slightly pungent to odorless
Physical State:	Solid	**pH:**	Not available (strong acidic reaction)
Vapor Pressure:	Not applicable	**Vapor Density:**	Not applicable
Boiling Point:	Not applicable	**Melting Point:**	Not applicable
Solubility (H2O):	Not applicable	**Specific Gravity:**	Not applicable

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability

Stable under normal conditions.

Chemical Stability: Conditions to Avoid

Avoid contact with water. Tube's contents react with bases. Possibility of strong exothermic reaction to water and bases. Do not store above 77º F (25º C).

Incompatibility

Avoid contact with water. Do not mix other substances with the contents of tube.

Hazardous Decomposition

Decomposition of this product produces toxic sulfur oxides, acids and solutions of iodine and manganese compounds and decomposition products of the components cited in Section 2.

Hazardous Polymerization

Hazardous polymerization can occur.

* * * Section 11 - Toxicological Information * * *

Acute and Chronic Toxicity

A: General Product Information

Components of tubes may emit toxic and choking vapors which are may cause severe irritation or injury to the eyes, throat and lungs. If the glass tube is broken, the sharp edges may cause cuts or scrapes. Sulfuric acid is corrosive to the eyes, skin, respiratory system and gastrointestinal tract. Exposure to sulfuric acid may lead to dental erosion, bronchitis, fibrosis, emphysema and pulmonary edema. Exposure to mists containing sulfuric acid have been implicated in causing cancer in humans.

B: Component Analysis - LD50/LC50

Hydrazine hydrate (7803-57-8)

Oral LD50 Rat: 129 mg/kg; Oral LD50 Mouse: 83 mg/kg

Sulfuric acid (7664-93-9)

Inhalation LC50 Rat: 510 mg/m3/2H; Inhalation LC50 Mouse: 320 mg/m3/2H; Oral LD50 Rat: 2140 mg/kg

Pyridine (110-86-1)

Inhalation LC50 Rat: 28500 mg/m3/1H; Oral LD50 Rat: 891 mg/kg; Oral LD50 Mouse: 1500 mg/kg; Dermal LD50 Rabbit: 1121 mg/kg

Iodine (7553-56-2)

Oral LD50 Rat: 14 g/kg; Oral LD50 Mouse: 22 g/kg

Xylene (1330-20-7)

Inhalation LC50 Rat: 5000 ppm/4H; Oral LD50 Rat: 4300 mg/kg; Dermal LD50 Rabbit: >1700 mg/kg

Acetic anhydride (108-24-7)

Inhalation LC50 Rat: 1000 ppm/4H; Oral LD50 Rat: 1780 mg/kg; Dermal LD50 Rabbit: 4 mL/kg

o-Toluidine (95-53-4)
Inhalation LC50 Rat: 862 ppm/4H; Oral LD50 Rat: 670 mg/kg; Oral LD50 Mouse: 520 mg/kg; Dermal LD50 Rabbit: 3250 µL/kg

Hydrochloric acid (7647-01-0)
Inhalation LC50 Rat: 3124 ppm/1H; Inhalation LC50 Mouse: 1108 ppm/1H

N,N-Diethylaniline (91-66-7)
Inhalation LC50 Rat: 1920 mg/m3/4H

Potassium permanganate (7722-64-7)
Oral LD50 Rat: 1090 mg/kg; Oral LD50 Mouse: 2157 mg/kg

Furfurol (98-01-1)
Inhalation LC50 Rat: 175 mg/kg/6H; Oral LD50 Rat: 65 mg/kg; Oral LD50 Mouse: 400 mg/kg

Formaldehyde (50-00-0)
Inhalation LC50 Mouse: 454 mg/m3/4H; Oral LD50 Rat: 100 mg/kg; Oral LD50 Mouse: 42 mg/kg; Dermal LD50 Rabbit: 270 µL/kg

o-Dianisidine (119-90-4)
Oral LD50 Rat: 1920 mg/kg

Carcinogenicity

A: General Product Information

No information available.

B: Component Carcinogenicity

Sulfuric acid (7664-93-9)
ACGIH: A2 - Suspected Human Carcinogen (contained in strong inorganic acid mists)
IARC: Monograph 54, 1992 (Group 1 (carcinogenic to humans))

Pyridine (110-86-1)
ACGIH: A3 - Confirmed animal carcinogen with unknown relevance to humans
IARC: Monograph 77, 2000 (Group 3 (not classifiable))

Chromium (VI) salts (Not Available)
NIOSH: potential occupational carcinogen

Xylene (1330-20-7)
ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Monograph 71, 1999; Monograph 47, 1989 (Group 3 (not classifiable))

o-Toluidine (95-53-4)
ACGIH: A3 - Confirmed animal carcinogen with unknown relevance to humans
NIOSH: potential occupational carcinogen
NTP: Reasonably Anticipated To Be A Carcinogen (Possible Select Carcinogen)
IARC: Monograph 77, 2000 (Group 2A (probably carcenogenic to humans))

Hydrochloric acid (7647-01-0)
ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Monograph 54, 1992 (Group 3 (not classifiable))

Furfurol (98-01-1)
ACGIH: A3 - Confirmed animal carcinogen with unknown relevance to humans
IARC: Monograph 63, 1995 (Group 3 (not classifiable))

Formaldehyde (50-00-0)
ACGIH: A2 - Suspected Human Carcinogen
OSHA: 0.75 ppm TWA; 2 ppm STEL; 0.5 ppm Action Level (Irritant and potential cancer hazard - see 29 CFR 1910.1048)
NIOSH: potential occupational carcinogen
NTP: Reasonably Anticipated To Be A Carcinogen (Possible Select Carcinogen)
IARC: Monograph 88, 2004 (Group 1 (carcinogenic to humans))

o-Dianisidine (119-90-4)
NIOSH: potential occupational carcinogen
NTP: Reasonably Anticipated To Be A Carcinogen (Possible Select Carcinogen)
IARC: Supplement 7, 1987; Monograph 4, 1974 (Group 2B (possibly carcinogenic to humans))

Zirconium (7440-67-7)
ACGIH: A4 - Not Classifiable as a Human Carcinogen

Mutagenicity
Chromium VI compounds have been mutagenic in bacteria, caused chromosome aberrations in mammalian cells and have been associated with increased frequencies of chromosome aberrations in lymphocytes in chromate workers.

Teratogenicity
Chromium VI compounds have caused birth defects and affected fertility in laboratory animals.

*** Section 12 - Ecological Information ***

Ecotoxicity

A: General Product Information
Because of the low pH of this product, it would be expected to produce significant ecotoxicity upon exposure to aquatic organisms and aquatic systems.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

Pyridine (110-86-1)

Test & Species		Conditions
96 Hr LC50 fathead minnow	93.8 mg/L	flow-through
96 Hr LC50 carp	26.0 mg/L	
24 Hr EC50 freshwater algae (Tetrahymena pyriformis)	520 mg/L	
48 Hr LC50 water flea	520 mg/L	

Xylene (1330-20-7)

Test & Species		Conditions
96 Hr LC50 fathead minnow	13.4 mg/L	flow-through
96 Hr LC50 rainbow trout	8.05 mg/L	flow-through
96 Hr LC50 bluegill	16.1 mg/L	flow-through
24 hr EC50 Photobacterium phosphoreum	0.0084 mg/L	
48 Hr EC50 water flea	3.82 mg/L	

Acetic anhydride (108-24-7)

Test & Species		Conditions
48 Hr LC50 golden orfe	265 mg/L	
24 Hr EC50 water flea	55 mg/L	

o-Toluidine (95-53-4)

Test & Species		Conditions
30 min EC50 Photobacterium phosphoreum	13.2 mg/L	

Hydrochloric acid (7647-01-0)

Test & Species		Conditions
48 Hr LC50 bluegill	3.6 mg/L	

N,N-Diethylaniline (91-66-7)

Test & Species		Conditions
96 Hr LC50 fathead minnow	16.4 mg/L	flow-through
5 min EC50 Photobacterium phosphoreum	6.50 mg/L	
15 min EC50 Photobacterium phosphoreum	7.70 mg/L	

Potassium permanganate (7722-64-7)

Test & Species		Conditions
96 Hr LC50 goldfish	3.6 mg/L	
24 Hr LC50 striped bass	1.5 mg/L	Static

Furfurol (98-01-1)

Test & Species		Conditions
96 Hr LC50 fathead minnow	32 mg/L	
48 Hr LC50 harlequin fish	23 mg/L	
24 Hr EC50 water flea	36 mg/L	

Formaldehyde (50-00-0)

Test & Species		Conditions
96 Hr LC50 fathead minnow	24.1 mg/L	flow-through
96 Hr LC50 bluegill	0.10 mg/L	flow-through
5 min EC50 Photobacterium phosphoreum	9.0 mg/L	
15 min EC50 Photobacterium phosphoreum	7.26 mg/L	
25 min EC50 Photobacterium phosphoreum	6.81 mg/L	
96 Hr EC50 water flea	20 mg/L	

Environmental Fate

No information available for the product.

* * * Section 13 - Disposal Considerations * * *

US EPA Waste Number & Descriptions

A: General Product Information

If discarded, wastes may be classified as: D002, D003 (Corrosive, Reactive Waste)
Wastes must be tested using methods described in 40 CFR Part 261 to determine if it meets applicable definitions of hazardous wastes.

B: Component Waste Numbers

Pyridine (110-86-1)

RCRA: waste number U196
5.0 mg/L regulatory level

Xylene (1330-20-7)

RCRA: waste number U239 (Ignitable waste, Toxic waste)

o-Toluidine (95-53-4)

RCRA: waste number U328

Furfurol (98-01-1)
RCRA: waste number U125 (Ignitable waste)

Formaldehyde (50-00-0)
RCRA: waste number U122

o-Dianisidine (119-90-4)
RCRA: waste number U091

Disposal Instructions

Prior to disposal, carefully dilute tube contents with water. Add baking soda to neutralize acidity. Do not allow this material to drain into sewers/water supplies. Waste must be handled in accordance with all federal, state, provincial, and local regulations.

* * * Section 14 - Transportation Information * * *

International Transportation Regulations

This product is non-hazardous as defined by transport regulations.

* * * Section 15 - Regulatory Information * * *

US Federal Regulations

A: General Product Information

Components of this product have been checked against the non-confidential TSCA inventory by CAS Registry Number. Components not identified on this non-confidential inventory are exempt from listing (i.e. as polymers) or are listed on the confidential inventory as declared by the supplier.

B: Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Sulfuric acid (7664-93-9)
SARA 302: 1000 lb TPQ
SARA 313: 1.0 % de minimis concentration (acid aerosols including mists, vapors, gas, fog, and other airborne forms of any particle size)
CERCLA: 1000 lb final RQ; 454 kg final RQ

Pyridine (110-86-1)
SARA 313: 1.0 % de minimis concentration
CERCLA: 1000 lb final RQ; 454 kg final RQ

Xylene (1330-20-7)
CERCLA: 100 lb final RQ; 45.4 kg final RQ

Acetic anhydride (108-24-7)
CERCLA: 5000 lb final RQ; 2270 kg final RQ

o-Toluidine (95-53-4)
SARA 313: 0.1 % de minimis concentration
CERCLA: 100 lb final RQ; 45.4 kg final RQ

Hydrochloric acid (7647-01-0)
SARA 302: 500 lb TPQ
CERCLA: 5000 lb final RQ; 2270 kg final RQ

N,N-Diethylaniline (91-66-7)
CERCLA: 1000 lb final RQ; 454 kg final RQ

Potassium permanganate (7722-64-7)
CERCLA: 100 lb final RQ; 45.4 kg final RQ

Furfurol (98-01-1)
CERCLA: 5000 lb final RQ; 2270 kg final RQ

Formaldehyde (50-00-0)
SARA 302: 500 lb TPQ
CERCLA: 100 lb final RQ; 45.4 kg final RQ

o-Dianisidine (119-90-4)
CERCLA: 100 lb final RQ; 45.4 kg final RQ

State Regulations

A: General Product Information

Other state regulations may apply. Check individual state requirements.

B: Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
Hydrazine hydrate	7803-57-8	No	No	No	Yes	No	No
Sulfuric acid	7664-93-9	Yes	Yes	Yes	Yes	Yes	Yes
Pyridine	110-86-1	Yes	Yes	Yes	Yes	Yes	Yes
Iodine	7553-56-2	Yes	Yes	Yes	Yes	Yes	Yes
Xylene	1330-20-7	Yes	Yes	Yes	Yes	Yes	Yes
Acetic anhydride	108-24-7	Yes	Yes	Yes	Yes	Yes	Yes
o-Toluidine	95-53-4	Yes	Yes	Yes	Yes	Yes	Yes
Hydrochloric acid	7647-01-0	Yes	Yes	Yes	Yes	Yes	Yes
N,N-Diethylaniline	91-66-7	No	Yes	No	Yes	Yes	No
Potassium permanganate	7722-64-7	Yes	Yes	No	Yes	Yes	Yes
Furfurol	98-01-1	Yes	Yes	Yes	Yes	Yes	Yes
Formaldehyde	50-00-0	Yes	Yes	Yes	Yes	Yes	Yes
o-Dianisidine	119-90-4	Yes	Yes	Yes	Yes	Yes	Yes
Magnesium perchlorate	10034-81-8	No	Yes	No	Yes	Yes	Yes
Zirconium	7440-67-7	Yes	Yes	Yes	Yes	Yes	Yes

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.

Component Analysis - WHMIS IDL

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

Component	CAS #	Minimum Concentration
Sulfuric acid	7664-93-9	1 % (English Item 1485, French Item 138)
Pyridine	110-86-1	1 % (English Item 1374, French Item 1459)
Iodine	7553-56-2	1 % (English Item 875, French Item 1020)
o-Toluidine	95-53-4	0.1 % (English Item 1589, French Item 1633)

Additional Regulatory Information

A: General Product Information

No additional information available.

B: Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC
Hydrazine hydrate	7803-57-8	No	No	No
Sulfuric acid	7664-93-9	Yes	DSL	EINECS
Pyridine	110-86-1	Yes	DSL	EINECS
Iodine	7553-56-2	Yes	DSL	EINECS
Xylene	1330-20-7	Yes	DSL	EINECS
Acetic anhydride	108-24-7	Yes	DSL	EINECS
o-Toluidine	95-53-4	Yes	DSL	EINECS
Hydrochloric acid	7647-01-0	Yes	DSL	EINECS
N,N-Diethylaniline	91-66-7	Yes	DSL	EINECS
Potassium permanganate	7722-64-7	Yes	DSL	EINECS
Cerium sulfate	10294-42-5	No	No	No
Furfurol	98-01-1	Yes	DSL	EINECS
Formaldehyde	50-00-0	Yes	DSL	EINECS
2,4-Dinitrophenylhydrazine	119-26-6	Yes	DSL	EINECS
o-Dianisidine	119-90-4	Yes	DSL	EINECS
Iodine pentoxide	12029-98-0	Yes	DSL	EINECS
Magnesium perchlorate	10034-81-8	Yes	DSL	EINECS
Bariumchloroanilate	13435-46-6	Yes	DSL	EINECS
Pyridylpyridinium chloride	22752-98-3	No	No	EINECS
Butyrylcholiniodide	2494-56-6	Yes	NDSL	EINECS
Zirconium	7440-67-7	Yes	DSL	EINECS

* * * Section 16 - Other Information * * *

Other Information

Reasonable care has been taken in the preparation of this information, but the manufacturer makes no warranty of merchantability or any other warranty, expressed or implied, with respect to this information. The manufacturer makes no representations and assumes no liability for any direct, incidental or consequential damages resulting from its use.

Key/Legend

ACGIH = American Conference of Governmental Industrial Hygienists. CERCLA = Comprehensive Environmental Response, Compensation and Liability Act. CFR = Code of Federal Regulations. EINECS = European Inventory of Existing Commercial Chemical Substances. EPA = Environmental Protection Agency. HEPA = High Efficiency Particulate Air. HMIS = Hazardous Material Information System. IARC = International Agency for Research on Cancer. NFPA = National Fire Protection Association. NIOSH = National Institute of Occupational Safety and Health. NJTSR = New Jersey Trade Secret Registry. NTP = National Toxicology Program. OSHA = Occupational Safety and Health Administration. NA = Not available or Not Applicable. SARA = Superfund Amendments and Reauthorization Act. TLV = Threshold Limit Value. TSCA = Toxic Substance Control Act.

Contact: Product Manager

Contact Phone: 412-787-8383

This is the end of MSDS # 9030165

ISOBUTYLENE

AIRGAS INC -- ISOBUTYLENE-C4H8

==========

MSDS Safety Information

==========

FSC: 6665
NIIN: 01-214-8247
MSDS Date: 01/16/1998
MSDS Num: CLCRL
Product ID: ISOBUTYLENE-C4H8
MFN: 01
Responsible Party
Cage: UO451
Name: AIRGAS INC
Address: 259 RADNOR-CHESTER RD SUITE 100
City: RADNOR PA 19087-5240
Info Phone Number: 1-610-687-5253
Emergency Phone Number: (800)424-9300
Resp. Party Other MSDS No.: DOCUMENT NUMBER: 1031
Chemtrec IND/Phone: (800)424-9300
Published: Y

==========

Preparer Co. when other than Responsible Party Co.

==========

Cage: 0KBF5
Name: CHEMICAL SAFETY ASSOCIATES INC
Address: 9163 CHESAPEAKE DR
City: SAN DIEGO CA 92123-1002

==========

Contractor Summary

==========

Cage: UO451
Name: AIRGAS INC
Address: 259 RADNOR-CHESTER RD SUITE 100
City: RADNOR PA 19087-5240
Phone: 1-610-687-5253
Cage: 7Z016
Name: KAMPI COMPONENTS CO., INC.
Address: 210 RT 13
Box: 721
City: BRISTOL PA 19007-3517
Phone: 215-736-2000
Contract Number: SP0440-00-M-JA63

==========

Item Description Information

==========

Item Manager: S9G
Item Name: CALIBRATION GAS CYL
Specification Number: NONE
Type/Grade/Class: NONE
Unit of Issue: EA
UI Container Qty: 1
Type of Container: CYLINDER

==========

Ingredients
==========
Cas: 115-11-7
RTECS #: UD0890000
Name: ISOBUTYLENE
> Wt: 90.

Name: MAXIMUM IMPURITIES
< Wt: 1.
==========
Health Hazards Data
==========
Route Of Entry Inds - Inhalation: YES
Carcinogenicity Inds - NTP: NO
IARC: NO
OSHA: NO
Effects of Exposure: ACUTE: THE MOST SIGNIFICANT HAZARD IS OXYGEN-DEFICIENT ATOMSPHERES. AT HIGH CONCENTRATIONS UNCONSCIOUSNESS OR DEATH MAY OCCUR. CONTACT WITH LIQUIDFIED GAS OR RAPIDLY EXPANDING GASES MAY CAUSE FROSTBITE.
ISOBUTYLENE ALSO HAS SOME DEGREE OF ANESTHETIC ACTION AND CAN BE MILDLY IRRITATING TO THE MUCOUS MEMBRANES. CHRONIC: NO KNOWN ADVERSE HEALTH EFFECTS
ASSOCIATED WITH CHRONIC EXPOSURE TO ISOBUTYLENE. TARGET ORGANS: RESPIRATORY
SYSTEM.
Explanation Of Carcinogenicity: ISOBUTYLENE IS NOT FOUND ON THE FOLLOWING LISTS: FEDERAL OSHA Z LIST, NTP, IARC, CAL/OSHA, AND THEREFORE IS NEITHER CONSIDERED TO BE NOR SUSPECTED TO BE A CANCER-CAUSING AGENT BY THESE AGENCIES.
Signs And Symptoms Of Overexposure: INHALATION: SYMPTOMS OF OXYGEN DEFICIENCY INCLUDE RESPIRATORY DIFFICULTY, HEADACHES, RINGING IN EARS, DIZZINESS, DROWSINESS, UNCONSCIOUSNESS, NAUSEA, VOMITING, AND DEPRESSION OF ALL THE SENSES. UNDER SOME CIRCUSTANCES OF OVEREXPOSURE, DEATH MAY OCCUR.
First Aid: RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO ISOBUTYLENE WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. AT A MINIMUM, SELF-CONTAINED BREATHING APPARATUS AND FIRE-RETARDANT PERSONAL PROTECTIVE EQUIPMENT SHOULD BE WORN. FIRE PROTECTION MUST BE PROVIDED DURING RESCUE SITUATIONS. REMOVE VICTIMS(S) TO FRESH AIR. TRAINED PERSONNEL SHOULD ADMINISTER OXYGEN AND/OR CARDIO-PULMONARY RESUS CITATION, IF NECESSARY. IN CASE OF FROSTBITE, PLACE FROSTBITEN PART IN WARM WATER. (CONTD. SEE OTHER INFORMATION)
==========
Handling and Disposal
==========
Spill Release Procedures: UNCONTROLLED RELEASES SHOULD BE COVERED BY TRAINED PERSONNEL USING PRE-PLANNED PROCEDURES. PROPER PROTECTIVE EQUIPMENT SHOULD BE
USED. ADEQUATE FIRE PROTECTION MUST BE PROVIDED. MINIMUM PERSONAL PROTECTIVE
EQUIPMENT SHOULD BE LEVEL B: FIRE RETARDANT PROTECTIVE CLOTHING, GLOVES RESISTANT TO TEARS AND SELF CONTAINED BREATHING APPARATUS. USE NON-SPARKING TOOLS AND (CONTD. SEE "WASTE DISPOSAL))
Waste Disposal Methods: WASTE DISPOSAL MUST BE IN ACCORDANCE WITH APPROPRIATE FEDERAL, STATE, AND LOCAL REGULTIONS. RETURN CYLINDERS WITH ANY RESIDUAL PRODUCT TO AIRGAS INC. DO NOT DISPOSE OF LOCALLY. (CONTD. FROM "SPILL REL

EASE") EQUIPMENT. IF NOT ABLE TO STOP RELEASE, ALLOW GAS TO RELEASE IN PLACE
OR REMOVE TO A SAFE ARE A AND ALLOW GAS TO RELEASE.
Handling And Storage Precautions: STORE IN COOL(,< 125F), DRY,
WELL-VENTILATED AREA AWAY FROM SOURCES OF HEAT, IGNITION, DIRECT SUNLIGHT.
COMPRESSED GASES PRESENT SAFETY HAZARD. STORE AWAY FROM OXIDIZERS, OXIGEN,
CHLORINE, FLUORINE, H EAVILY TRAFFICKED AREAS, EMERGENCY EXITS. POST "NO
SMOKING OR NO OPEN FLAMES " SIGNS.
Other Precautions: ELECTRICAL EQUIPMENT SHOULD BE NON-SPARKING. MOVE CYLINDERS
WITH HAND TRUCK. DO NOT DRAG, ROLL, DROP, STRIKE EACH OTHER. SECURE FIRMLY.
DO NOT HEAT CYLINDER OR USE OILS OR GREASE ON GAS-HANDLING FITTI NGS OR
EQUIPMENT. USE DESIGNATED CGA FITTINGS. DO NOT USE ADAPTERS. USE CHECK VALVE
OR TRAP IN DISCH ARGE LINE.

Fire and Explosion Hazard Information

Flash Point Method: CC
Flash Point: <-10.C, 14.F
Autoignition Temp: =465.C, 869.F
Lower Limits: 1.8
Upper Limits: 9.6
Extinguishing Media: EXTINGUISH ISOBUTYLENE FIRES BY SHUTTING OFF THE SOURCE OF
THE GAS. USE WATER SPRAY OR A FOAM AGENT TO COOL FIRE-EXPOSED CONTAINERS,
STRUCTURES AND EQUIPMENT.
Fire Fighting Procedures: STRUCTURAL FIREFIGHTERS MUST WEAR SELF-CONTAINED
BREATHING APPARATUS AND FULL PROTECTIVE EQUIPMENT. THE BEST FIRE-FIGHTING
TECHNIQUE MAY BE SIMPLY TO LET THE BURNING GAS ESCAPE FROM THE PRESSURIZED CY
LINDER, TANK CAR, OR PIPELINE. STOP THE LEAK BEFORE EXTINGUISHING FIRE.
LEAKING GAS COULD EXPLOSIVELY RE-IGNITE.
Unusual Fire/Explosion Hazard: WHEN INVOLVED IN A FIRE, THIS MATERIAL MAY
IGNITE AND PRODUCE TOXIC GASES, INCLUDING CARBON MONOXIDE AND CARBON DIOXIDE.

Control Measures

Respiratory Protection: MAINTAIN OXYGEN LEVELS ABOVE 19.5% IN THE WORKPLACE.
USE SUPPLIED AIR RESPIRATORY PROTECTION IF OXYGEN LEVELS ARE BELOW 19.5% OR
DURING EMERGENCY RESPONSE TO A RELEASE OF ISOUTYLENE. IF RESPIRATORY PR
OTECTION IS REQUIRED, FOLLOW THE REQUIREMENTS OF THE FEDERAL OSHA RESPIRATORY
STANDARD (29 CFR 1910.134) OR EQUIVALENT STATE STANDARDS.
Ventilation: USE ADEQUATE VENTILATION. LOCAL EXHAUST VENTILATION IS PERFERRED,
BECAUSE IT PREVENTS ISOBUTYLENE DISPERSION INTO THE WORKPLACE BY EMLIMINATING
IT AT THE SOURCE
Protective Gloves: RESISTANT TO TEARS. USE LOW-TEMPERATURE PROTECTIVE GLOVED
(E.G., KEVLAR)
Eye Protection: SPLASH GOGGLES OR SAFETY GLASSES.
Other Protective Equipment: USE BODY PROTECTION . TRANSFER OF LARGE QUANTITIES
UNDER PRESSURE MAY REQUIRE PROTECTIVE EQUIPMET TO PROTECT FROM SPLASHES OF
LIQUIDFIED PRODUCT AS WELL AS FIRE RETARANAT ITEMS.

Work Hygienic Practices: AS WITH ALL CHEMICALS, AVOID GETTING ISOBUTYLENE IN YOU. DO NOT EAT OR DIRNK WHILE HANDLING CHEMICALS. BEWARE OF ANY SIGNS OF DIZZINESS OR FATIGUE; EXPOSURES TO FATAL CONCENTRATIONS OF ISOBUTYLENE COULD
Supplemental Safety and Health: (CONTD. FROM FIRST AID) DO NOT USE HOT WATER.
IF WARM WATER NOT AVAILABLE, OR IMPRACTICAL TO USE, WRAP AFFECTED PARTS GENTLY IN BLANKETS. (SEE OTHER INFORMATION)

==========

Physical/Chemical Properties

==========

HCC: G2
Boiling Point: =-6.9C, 19.6F
Melt/Freeze Pt: =-140.C, -220.F
Vapor Pres: 39 PSIA
Vapor Density: 0.15LB/FT3
Spec Gravity: 1.997
PH: NA
Solubility in Water: INSOLUBLE
Appearance and Odor: COLORLESS LIQUID/ GAS WITH THE UNPLEASANT ODOR OF BURNING
COAL.

==========

Reactivity Data

==========

Stability Indicator: YES
Stability Condition To Avoid: CONTACT WITH INCOMPATIBLE MATERIALS AND EXPOSURE
TO HEAT, SPARKS, AND ORTHER SOURCES OF IGNITION. CYLINDERS EXPOSED TO HIGH TEMPERATURES OR DIRECT FLAME CAN RUPTURE OR BURST.
Materials To Avoid: STRONG OXIDIZERS (E.G., CHLORINE, BROMINE PENTAFLUORIDE, OXYGEN, OXYGEN DIFLUORIDE, AND NITROGEN TRIFLUORIDE).
Hazardous Decomposition Products: WHEN IGNITED IN THE PRESENCE OF OXYGEN, THIS
GAS WILL BURN TO PRODUCE CARBON MONOXIDE AND CARBON DIOXIDE.
Hazardous Polymerization Indicator: NO
Conditions To Avoid Polymerization: WILL NOT OCCUR.

==========

Toxicological Information

==========

Toxicological Information: LC50 (RAT, INHALATION): 620 G/M3/ 4 HOURS; LC50 (MOUSE, INHALATION): 415 G/M3/ 2 HOUR. ISOBUTYLENE IS NOT FOUND ON FEDERAL OSHA Z LIST, NTP, IARC, CAL/OSHA, AND THEREFORE IS NEITHER CONSIDERED TO BE N OR SUSPECTED TO BE A CANCER-CAUSING AGENT BY THESE AGENCIES. PRODUCT MAY BE MILDLY IRRITATING TO THE MUCOUS MEMBRANES. IN ADDITION, CONTACT WITH RAPIDLY
EXPANDING GASES CAN CAUSE FROSTBITE TO EXPOSED TISSUE. ISOBUTYLENE IS NOT KNOWN TO CAUSE SENSITIZATION IN HUMANS. NO MUTAGENIC EFFECTS, NO EMBRYOTOXIC
EFFECTS, NO TERATOGENIC EFFECTS, NO REPRODUCTIVE TOXICITY EFFECTS HAVE BEEN DESCRIBED FOR BUTYLENE.

==========

Ecological Information

==========

Ecological: ENVIRONMENTAL STABILITY: THIS GAS WILL BE DISSIPATED RAPIDLY IN

WELL-VENTILATED AREAS. EFFECTS OF MATERIAL ON PLANTS OR ANIMALS: ANY ADVERSE
EFFECT ON ANIMALS WOULD BE RELATED TO OXYGEN-DEFICIENT ENVI RONMENTS. NO ADVERSE EFFECT IS ANTICIPATED TO OCCUR TO PLANT LIFE, EXCEPT FOR FROST PRODUCED IN THE PRESENCE OF RAPIDLY EXPANDING GASES. EFFECT OF CHEMICAL ON AQUATIC LIFE: NO EVIDENCE IS CURRENTLY AV AILABLE ON THE EFFECTS OF ISOBUTYLENE ON AQUATIC LIFE.

==========

MSDS Transport Information

==========

Transport Information: THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101
BY THE U.S. DEPARTMENT OF TRANSPORTATION. PROPER SHIPPING NAME: ISOBUTYLENE;
CLASS: 2.1 (FLAMMABLE GAS); UN 1055; PKG: N/A; DOT LABELS REQUIRED: FLAMMABLE GAS; NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996): 115. ALTERNATE DESCRIPTION: PSN: PETROLEUM GASES, LIQUIDFIED; CLASS: 2.1 (FLAMMABLE GAS); UN 1075; PKG N/A; DOT LABEL REQUIRE D: FLAMMABLE GAS; NORTH
AMERICAN EMERGENCY GUIDEBOOK NUMBER: 115; MARINE POLLUTANT: ISOBUTYLENE IS NOT CLASSIFIED BY THE DOT AS A MARINE POLLUTANT (AS DEFINED BY 49 CFR 172.101, APPENDIX B). CANADA: SAME AS ABOVE.

==========

Regulatory Information

==========

Sara Title III Information: ISOBUTYLENE IS NOT SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 302, 304, AND 313 OF TITLE I I I OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT. U.S. SARA THRESHOLD PLANNING QUANTITY: N/A. U. S. CERCLA REPORTABLE QUANTITY (RQ): NOT APPLICIABLE.ING RE
Federal Regulatory Information: ISOBUTYLENE IS LISTED ON THE U.S. TSCA INVENTORY. ISOBUTYLENE IS SUBJECT TO REPORTING REQUIREMENTS OF SECTION 112(R)
OF THE CLEAN AIR ACT. THRESHOLD QUANTITY FOR THIS GAS IS 10,000 LB. DEPENDING
ON SP ECIFIC OPERATIONS INVOLVING USE OF ISOBUTYLENE, REGULATIONS OF THE PROCESS SAFETY MANAGEMENT OF HIGHLY HAZARDOUS CHEMICALS MAY BE APPLICABLE (29
CFR 1910.119) UNDER THIS REGULATION ISOBUTYLENE IS NOT LISTED IN APPENDIX A;
HOWEVER, ANY PROCESS THAT INVOLVES A FLAMMABLE GAS ON-SITE, IN ONE LOCATION,
I N QUANTITIES OF 10,000 LB (4,553 KG) OR GREATER IS COVERED UNDER THIS REGULATION UNLESS IT IS USED AS A FUEL.
State Regulatory Information: CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): ISOBUTYLENE IS NOT ON THE CALIFORNIA PROPOSITION 65 LISTS. PRODUCT COVERED UNDER FOLLOWING STATE REGULATIONS: AK:
DESIGNATED TOXIC AND HAZARDOUS SUBSTANCES. CA: PERMISSIBLE EXPOSURE LIMITS FOR CHEMICAL CONTAMINANTS; FL:SUBSTANCE LIST; MA: SUBSTANCE LIAT; MN:LIST OF
HAZARDOUS SUBSTANCES; NJ: RIGHT TO KNOW HAZARDOUS SUBSTANCE LIST; PA: HAZARDOUS SUBSTANCE LIST; RI: HAZARDOUS SUBSTANCE LIST; TX: HAZARDOUS SUBSTANCE LIST: WV: HAZARDOUS SUBSTANCE LIST; WI: TOXIC AND HAZARDOUS SUBSTANCES.

==========

Other Information

==========

Other Information: (CONTD. FROM FIRST AID) DO NOT USE HOT WATER. IF WARM WATER
NOT AVAILABLE, WRAP AFFECTED PARTS IN BLANKETS. ALTERNATIVELY, IF FINGERS OR
HANDS ARE FORTBITTEN, PLACE IN ARMPIT. HAVE VICTIM GENTLY EXERC ISE AFFECTED
PARTS WHILE BEING WARMED. SEEK MEDICAL ATTENTION. TAKE COPY OF LABEL AND MSDS TO PHYSICIAN WITH VICTIM. NFPA RATING: HEALTH: 1; FLAMMIBILITY: 4; REACTIVITY: 0. RATINGS: HEALTH: 1; FLAMMABILITY: 4; REACTIVITY: 0; PROTECTIVE EQUIPMENT: B. CANADIAN W SYMBOLS: CLASS A: COMPRESSED GAS; CLASS B1: FLAMMABLE GAS.

==========
Transportation Information
==========
Responsible Party Cage: UO451
Trans ID NO: 156921
Product ID: ISOBUTYLENE-C4H8
MSDS Prepared Date: 01/16/1998
Review Date: 05/14/2001
MFN: 1
Multiple KIT Number: 0
Unit Of Issue: EA
Container QTY: 1
Type Of Container: CYLINDER
Additional Data: TRANSPORTATION DATA PER MANUFACTURER'S MSDS.
==========
Detail DOT Information
==========
DOT PSN Code: HTR
DOT Proper Shipping Name: ISOBUTYLENE
DOT PSN Modifier: SEE ALSO PETROLEUM GASES, LIQUEFIED
Hazard Class: 2.1
UN ID Num: UN1055
Label: FLAMMABLE GAS
Special Provision: 19
Packaging Exception: 306
Non Bulk Pack: 304
Bulk Pack: 314,315
Max Qty Pass: FORBIDDEN
Max Qty Cargo: 150 KG
Vessel Stow Req: E
Water/Ship/Other Req: 40
==========
Detail IMO Information
==========
IMO PSN Code: IRQ
IMO Proper Shipping Name: ISOBUTYLENE
IMDG Page Number: 2147
UN Number: 1055
UN Hazard Class: 2(2.1)
IMO Packaging Group: -
Subsidiary Risk Label: -
EMS Number: 2-07
MED First Aid Guide NUM: 310
==========
Detail IATA Information

==========
IATA PSN Code: OHI
IATA UN ID Num: 1055
IATA Proper Shipping Name: ISOBUTYLENE
IATA UN Class: 2.1
IATA Label: FLAMMABLE GAS
Packing Note Passenger: FORB
Max Quant Pass: FORB
Max Quant Cargo: 150KG
Packaging Note Cargo: 200
Exceptions: A1
==========
Detail AFI Information
==========
AFI PSN Code: OHI
AFI Proper Shipping Name: ISOBUTYLENE
AFI Hazard Class: 2.1
AFI UN ID NUM: UN1055
Special Provisions: P4
Back Pack Reference: A6.3, A6.5

==========
HAZCOM Label
==========
Product ID: ISOBUTYLENE-C4H8
Cage: UO451
Assigned IND: Y
Company Name: AIRGAS INC
Street: 259 RADNOR-CHESTER RD SUITE 100
City: RADNOR PA
Zipcode: 19087-5240
Health Emergency Phone: (800)424-9300
Label Required IND: Y
Date Of Label Review: 05/14/2001
Status Code: A
Label Date: 05/14/2001
Origination Code: F
Eye Protection IND: YES
Skin Protection IND: YES
Signal Word: DANGER
Respiratory Protection IND: YES
Health Hazard: Moderate
Contact Hazard: Moderate
Fire Hazard: Severe
Reactivity Hazard: None
Hazard And Precautions: FLAMMABLE LIQUID AND GAS UNDER PRESSURE. CAN FORM
  EXPLOSIVE MIXTURES WITH AIR. MAY CAUSE FROSTBITE. KEEP AWAY FROM HEAT (<
  125F), FLAMES, AND SPARKS. STORE AND USE WITH ADEQUATE VENTILATION. MOST
SIGN
  IFICANT HAZARD IS OXYGEN-DEFICIENT ATOMSPHERES.
==========
Disclaimer (provided with this information by the compiling agencies): This
  information is formulated for use by elements of the Department of Defense.
  The United States of America in no manner whatsoever expressly or implied
  warrants, states, or intends said information to have any application, use
or
  viability by or to any person or persons outside the Department of Defense

nor any person or persons contracting with any instrumentality of the United States of America and disclaims all liability for such use. Any person utilizing this instruction who is not a military or civilian employee of the United States of America should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation regardless of similarity to a corresponding Department of Defense or other government situation.

Material Safety Data Sheet

24 Hour Assistance:
1-847-367-7700
Rust-Oleum Corp.
www.rustoleum.com

Section 1 - Chemical Product / Company Information

Product Name:	Industrial Choice Aerosol - Solvent Based Inverted Marking Paint	Revision Date:	03/22/2007
Identification Number:	203022, 203024, 203025, 203026, 203029, 203030, 1634838, 1668838, 1675838, 201516, 1652838, 239007, 1663838		
Product Use/Class:	Industrial Choice - Precision Line Marking Paint/Aerosol		
Supplier:	Rust-Oleum Corporation 11 Hawthorn Parkway Vernon Hills, IL 60061 USA	Manufacturer:	Rust-Oleum Corporation 11 Hawthorn Parkway Vernon Hills, IL 60061 USA
Preparer:	Department, Regulatory		

Section 2 - Composition / Information On Ingredients

Chemical Name	CAS Number	Weight % Less Than	ACGIH TLV-TWA	ACGIH TLV-STEL	OSHA PEL-TWA	OSHA PEL-CEILING
Liquefied Petroleum Gas	68476-86-8	35.0	1000 PPM	N.E.	1000 PPM	N.E.
Acetone	67-64-1	30.0	500 PPM	750 PPM	750 PPM	N.E.
Toluene	108-88-3	20.0	50 PPM	150 PPM	200 PPM	300 PPM
Aliphatic Hydrocarbon	64742-89-8	15.0	300 PPM	N.E.	300 PPM	N.E.
Xylene	1330-20-7	15.0	100 PPM	150 PPM	100 PPM	N.E.
Titanium Dioxide	13463-67-7	15.0	10 mg/m3	N.E.	10 mg/m3	N.E.
N-Butyl Acetate	123-86-4	15.0	150 PPM	200 PPM	150 PPM	N.E.
Aliphatic Petroleum Distillates	64742-48-9	10.0	400 PPM	N.E.	400 PPM	N.E.
Naphtha	8032-32-4	10.0	300 PPM	N.E.	N.E.	N.E.
Magnesium Silicate	14807-96-6	5.0	10 mg/m3	N.E.	15 mg/m3	N.E.
Ethylbenzene	100-41-4	5.0	100 PPM	125 PPM	100 PPM	N.E.
Aluminum Flake	7429-90-5	5.0	10 mg/m3	N.E.	15 mg/m3	N.E.
Pigment Black 7	1333-86-4	5.0	3.5 mg/m3	N.E.	3.5 mg/m3	N.E.
Calcined Aluminum Silicate	1332-58-7	5.0	2 mg/m3	N.E.	5 mg/m3	N.E.
Pigment Red 122	980-26-7	1.0	15mg/m3	N.E.	5mg/m3	N.E.
Microcrystalline Silica	14808-60-7	1.0	0.025 mg/m3	N.E.	0.10 mg/m3 respirable quartz	N.E.

Section 3 - Hazards Identification

*** Emergency Overview ***: Contents Under Pressure. Harmful if inhaled. May affect the brain or nervous system causing dizziness, headache or nausea. Vapors may cause flash fire or explosion. Extremely flammable liquid and vapor. Harmful if swallowed.

Effects Of Overexposure - Eye Contact: Causes eye irritation.

Effects Of Overexposure - Skin Contact: Prolonged or repeated contact may cause skin irritation. Substance may cause slight skin irritation.

Effects Of Overexposure - Inhalation: High vapor concentrations are irritating to the eyes, nose, throat and lungs. Avoid breathing vapors or mists. High gas, vapor, mist or dust concentrations may be harmful if inhaled. Harmful if

inhaled.

Effects Of Overexposure - Ingestion: Aspiration hazard if swallowed; can enter lungs and cause damage. Substance may be harmful if swallowed.

Effects Of Overexposure - Chronic Hazards: IARC lists Ethylbenzene as a possible human carcinogen (group 2B). May cause central nervous system disorder (e,g.,narcosis involving a loss of coordination, weakness, fatigue, mental confusion, and blurred vision) and/or damage. Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Overexposure to xylene in laboratory animals has been associated with liver abnormalities, kidney, lung, spleen, eye and blood damage as well as reproductive disorders. Effects in humans, due to chronic overexposure, have included liver, cardiac abnormalities and nervous system damage. Overexposure to toluene in laboratory animals has been associated with liver abnormalities, kidney, lung and spleen damage. Effects in humans have included liver and cardiac abnormalities.
Contains carbon black. Chronic inflammation, lung fibrosis, and lung tumors have been observed in some rats experimentally exposed for long periods of time to excessive concentrations of carbon black and several insoluble fine dust particles. Tumors have not been observed in other animal species (i.e., mouse and hampster) under similar circumstances and study conditions. Epidemiological studies of North American workers show no evidence of clinically significant adverse health effects due to occupational exposure to carbon black.
Carbon black is listed as a Group 2B-"Possibly carcinogenic to humans" by IARC and is proposed to be listed as A4- "not classified as a human carcinogen" by the American Conference of Govermental Industrial Hygienists. Significant exposure is not anticipated during brush application or drying. Risk of overexposure depends on duration and level of exposure to dust from repeated sanding of surfaces or spray mist and the actual concentration of carbon black in the formula. Contains crystalline silica as silicon dioxide. Excessive inhalation of respirable crystalline silica dust may cause lung disease, silicosis or lung cancer. Significant exposure is not anticipated during brush or trowel application or drying. Risk of overexposure depends on the duration and level of exposure to dust from repeated sanding of surfaces, mechanical abrasion or spray mist and actual concentration of crystalline silica in the formula. Crystalline silica is listed as Group 1 "carcinogenic to humans" by the International Agency for Research on Cancer (IARC,) and Group 2, "reasonably anticipated to be a carcinogen" by the National Toxicology Program (NTP)

Primary Route(s) Of Entry: Skin Contact, Skin Absorption, Inhalation, Eye Contact

Section 4 - First Aid Measures

First Aid - Eye Contact: Hold eyelids apart and flush with plenty of water for at least 15 minutes. Get medical attention.

First Aid - Skin Contact: Wash with soap and water. Get medical attention if irritation develops or persists.

First Aid - Inhalation: If you experience difficulty in breathing, leave the area to obtain fresh air. If continued difficulty is experienced, get medical assistance immediately.

First Aid - Ingestion: Aspiration hazard: Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. Get immediate medical attention.

Section 5 - Fire Fighting Measures

Flash Point: -156 F
(Setaflash)

LOWER EXPLOSIVE LIMIT: 0.7 %
UPPER EXPLOSIVE LIMIT : 12.8 %

Extinguishing Media: Dry Chemical, Foam, Water Fog

Unusual Fire And Explosion Hazards: FLASH POINT IS LESS THAN 20 °. F. - EXTREMELY FLAMMABLE LIQUID AND VAPOR! Water spray may be ineffective. Closed containers may explode when exposed to extreme heat.

Vapors may form explosive mixtures with air. Vapors can travel to a source of ignition and flash back. Perforation of the pressurized container may cause bursting of the can. Keep containers tightly closed. Isolate from heat, electrical equipment, sparks and open flame.

Special Firefighting Procedures: Evacuate area and fight fire from a safe distance.

Section 6 - Accidental Release Measures

Steps To Be Taken If Material Is Released Or Spilled: Remove all sources of ignition, ventilate area and remove with inert absorbent and non-sparking tools. Contain spilled liquid with sand or earth. DO NOT use combustible materials such as sawdust. Dispose of according to local, state (provincial) and federal regulations. Do not incinerate closed containers.

Section 7 - Handling And Storage

Handling: Wash hands before eating. Wash thoroughly after handling. Avoid breathing vapor or mist. Use only in a well-ventilated area. Follow all MSDS/label precautions even after container is emptied because it may retain product residues.

Storage: Contents under pressure. Do not expose to heat or store above 120 ° F. Do not store above 120 ° F. Store large quantities in buildings designed and protected for storage of NFPA Class I flammable liquids. Keep containers tightly closed. Isolate from heat, electrical equipment, sparks and open flame.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Prevent build-up of vapors by opening all doors and windows to achieve cross-ventilation. Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Use explosion-proof ventilation equipment.

Respiratory Protection: A respiratory protection program that meets OSHA 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use. A NIOSH/MSHA approved air purifying respirator with an organic vapor cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits.

Protection provided by air purifying respirators is limited. Use a positive pressure air supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air purifying respirators may not provide adequate protection.

Skin Protection: Nitrile or Neoprene gloves may afford adequate skin protection. Use impervious gloves to prevent skin contact and absorption of this material through the skin.

Eye Protection: Use safety eyewear designed to protect against splash of liquids.

Other protective equipment: Refer to safety supervisor or industrial hygienist for further information regarding personal protective equipment and its application.

Hygienic Practices: Wash thoroughly with soap and water before eating, drinking or smoking.

Section 9 - Physical And Chemical Properties

Boiling Range:	-34 - 900 F	Vapor Density:	Heavier than air
Odor:	Solvent Like	Odor Threshold:	ND

Appearance:	Liquid	Evaporation Rate:	Faster than Ether
Solubility in H2O:	Slight		
Freeze Point:	ND	Specific Gravity:	
Vapor Pressure:		PH:	NE
Physical State:	Liquid		

(See section 16 for abbreviation legend)

Section 10 - Stability And Reactivity

Conditions To Avoid: Avoid temperatures above 120 ° F. Avoid all possible sources of ignition. Flammable hydrogen gas will evolve when product comes in contact with water or damp air. Heat will be generated. The amount of heat generated will depend upon the volume of material in contact.

Incompatibility: Incompatible with strong oxidizing agents, strong acids and strong alkalies.

Hazardous Decomposition: When heated to decomposition, it emits acrid smoke and irritating fumes. By open flame, carbon monoxide and carbon dioxide.

Hazardous Polymerization: Will not occur under normal conditions.

Stability: This product is stable under normal storage conditions.

Section 11 - Toxicological Information

Product LD50: ND

Product LC50: ND

Chemical Name	LD50	LC50
Liquefied Petroleum Gas	N.D.	N.D.
Acetone	N.D.	N.D.
Toluene	N.D.	N.D.
Aliphatic Hydrocarbon	N.D.	N.D.
Xylene	N.D.	N.D.
Titanium Dioxide	>7500 mg/kg (ORAL, RAT)	N.D.
N-Butyl Acetate	13100 mg/kg (ORAL, RAT)	2000 PPM (INH 4 Hr, RAT)
Aliphatic Petroleum Distillates	N.D.	N.D.
Naphtha	>5000 mg/kg (ORAL, RAT)	N.D.
Magnesium Silicate	N.D.	TCLo:11mg/m3 inh.
Ethylbenzene	3500 mg/kg (ORAL, RAT)	N.D.
Aluminum Flake	N.D.	N.D.
Pigment Black 7	>8000 mg/kg (ORAL, RAT)	N.D.
Calcined Aluminum Silicate	5000 mg/kg (oral Rat)	N.D.
Pigment Red 122	N.D.	N.D.
Microcrystalline Silica	N.D.	N.D.

Section 12 - Ecological Information

Ecological Information: Product is a mixture of listed components.

Section 13 - Disposal Information

Disposal Information: Dispose of material in accordance to local, state and federal regulations and ordinances. Do not allow to enter storm drains or sewer systems.

Section 14 - Transportation Information

DOT Proper Shipping Name:	Aerosol	Packing Group:	---
DOT Technical Name:	---	Hazard Subclass:	---
DOT Hazard Class:	2.1	Resp. Guide Page:	126
DOT UN/NA Number:	UN1950		

Section 15 - Regulatory Information

CERCLA - SARA Hazard Category

This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

IMMEDIATE HEALTH HAZARD, CHRONIC HEALTH HAZARD, FIRE HAZARD

SARA Section 313:

Listed below are the substances (if any) contained in this product that are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendment and Reauthorization Act of 1986 and 40 CFR part 372:

Chemical Name	CAS Number
Toluene	108-88-3
Xylene	1330-20-7
Ethylbenzene	100-41-4

Toxic Substances Control Act:

Listed below are the substances (if any) contained in this product that are subject to the reporting requirements of TSCA 12(B) if exported from the United States:

None known

U.S. State Regulations: As follows -

New Jersey Right-to-Know:

The following materials are non-hazardous, but are among the top five components in this product.

Chemical Name	CAS Number
Calcium Carbonate	1317-65-3
C-9 HYDROCARBON RESIN UNSATURATED	71302-83-5

Pennsylvania Right-to-Know:

The following non-hazardous ingredients are present in the product at greater than 3%.

Chemical Name	CAS Number
Calcium Carbonate	1317-65-3
C-9 HYDROCARBON RESIN UNSATURATED	71302-83-5
Modified Alkyd	PROPRIETARY
Modified Alkyd	PROPRIETARY
Water	7732-18-5
Barium Sulfate	7727-43-7

California Proposition 65:

Warning: The following ingredients present in the product are known to the state of California to cause Cancer:

Chemical Name	CAS Number
Ethylbenzene	100-41-4
Microcrystalline Silica	14808-60-7
Benzene	71-43-2
Lead Compounds	NOT SPECIFIED
Formaldehyde	50-00-0
Cadmium Compounds	NOT SPECIFIED
Arsenic Compounds	NOT SPECIFIED
Nickel Compounds	NOT SPECIFIED
Acetaldehyde	75-07-0

Warning: The following ingredients present in the product are known to the state of California to cause birth defects, or other reproductive hazards.

Chemical Name	CAS Number
Toluene	108-88-3
Benzene	71-43-2
Mercury Compounds	NOT SPECIFIED
Lead Compounds	NOT SPECIFIED
Cadmium Compounds	NOT SPECIFIED
Arsenic Compounds	NOT SPECIFIED

International Regulations: As follows -

CANADIAN WHMIS:

This MSDS has been prepared in compliance with Controlled Product Regulations except for the use of the 16 headings.

CANADIAN WHMIS CLASS: AB5, D2A, D2B

Section 16 - Other Information

HMIS Ratings:

Health: 2 Flammability: 4 Reactivity: 0 Personal Protection: X

VOLATILE ORGANIC COMPOUNDS, g/l: NA

REASON FOR REVISION:

Legend: N.A. - Not Applicable, N.E. - Not Established, N.D. - Not Determined

The information contained on this MSDS has been checked and should be accurate. However, it is the responsibility of the user to comply with all Federal, State, and Local laws and regulations.